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Water Resources Data for Michigan, Water Year 1982

(U.S.) Geological Survey, Lansing, MI

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U.S. Department of Commerce
National Technical Information Service
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PB83-229500

Water Resources Data
Michigan
Water Year 1982

U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MI-82-1

Prepared in cooperation with the State of Michigan
and with other agencies

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U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

CALENDAR FOR WATER YEAR 1982

1981

OCTOBER

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1982

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Water Resources Data
Michigan
Water Year 1982

by John B. Miller, John L. Oberg, and Theodore Sieger Jr.

U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MI-82-1
Prepared in cooperation with the State of Michigan
and with other agencies

I

UNITED STATES DEPARTMENT OF THE INTERIOR

JAMES G. WATT, Secretary

GEOLOGICAL SURVEY

Dallas L. Peck, Director

For information on the water program in Michigan write to
District Chief, Water Resources Division
U.S. Geological Survey
6520 Mercantile Way, Suite 5
Lansing, Michigan 48910

1983

PREFACE

This volume of the annual hydrologic data report of Michigan is one of a series of annual reports that document hydrologic data gathered from the U.S. Geological Survey's surface- and ground-water data-collection networks in each State, Puerto Rico, and the Trust Territories. These records of streamflow, ground-water levels, and quality of water provide the hydrologic information needed by State, local, and Federal agencies, and the private sector for developing and managing our Nation's land and water resources. Hydrologic data for Michigan are contained in 1 volume.

This report is the culmination of a concerted effort by dedicated personnel of the U.S. Geological Survey who collected, compiled, analyzed, verified, and organized the data, and who typed, edited, and assembled the report. In addition to the authors, who had primary responsibility for assuring that the information contained herein is accurate, complete, and adheres to Geological Survey policy and established guidelines, the following individuals contributed significantly to the collection, processing, and tabulation of the data:

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This report was prepared in cooperation with the State of Michigan and with other agencies under the general supervision of T. R. Cummings, District Chief, Michigan, and S. P. Sauer, Regional Hydrologist, Northeast Region.

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Water resources data for the 1982 water year for Michigan consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water temperature of ground water. This report contains discharge records for 169 gaging stations; stage only records for 4 gaging stations; stage and contents for 5 lakes and reservoirs; water quality for 61 continuous-record stations; and water levels for 53 observation wells. Also included are 82 crest-stage partial-record stations and 44 low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Michigan.

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GAGING STATIONS, IN DOWNSTREAM ORDER, FOR WHICH RECORDS ARE PUBLISHED

[Letter after station name designates type of data: (d) discharge, (c) chemical, (b) biological, (g) gage height, (m) microbiological, (p) pesticide, (r) radio-chemical, (t) water temperature, (s) sediment]

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WATER RESOURCES DATA FOR MICHIGAN, 1982

INTRODUCTION

Water resources data for the 1982 water year for Michigan consist of records of stage, discharge and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water temperature of ground-water wells. This volume contains records for water discharge at 169 gaging stations; stage only at 4 gaging stations; stage and contents at 5 lakes and reservoirs; water quality at 61 gaging stations; and water levels at 53 observation wells. Locations of these sites are shown on figures 4-9. Also included are data for 82 crest-stage partial-record stations and 44 low-flow partial-record stations. Additional water data were collected at various sites not involved in the systematic data-collection program and are published as miscellaneous measurements and analyses. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State, local, and Federal agencies in Michigan.

Records of discharge and stage of streams, and contents or stage of lakes and reservoirs were first published in a series of U.S. Geological Survey water-supply papers entitled, "Surface Water Supply of the United States." Through September 30, 1960, these water-supply papers were in an annual series and then in a 5-year series for 1961-65 and 1966-70. Records of chemical quality, water temperatures, and suspended sediment were published from 1941 to 1970 in an annual series of water-supply papers entitled, "Quality of Surface Waters of the United States." Records of ground-water levels were published from 1935 to 1974 in a series of water-supply papers entitled, "Ground Water Levels in the United States." Water-supply papers may be consulted in the libraries of the principal cities in the United States or may be purchased from Branch of Distribution, U.S. Geological Survey, 604 South Pickett Street, Alexandria, VA 22304.

For water years 1961 through 1974, streamflow data was released by the Geological Survey in annual reports on a State-boundary basis. Water-quality records for water years 1964 through 1974 were similarly released either in separate reports or in conjunction with streamflow records. Ground-water records beginning with the 1956 calendar year and continuing through calendar year 1981 have been released by the Geological Survey in annual reports on a State-boundary basis.

Beginning with the 1975 water year, water data for streamflow, water quality, and ground water are published in official Survey reports on a State-boundary basis. These official Survey reports carry an identification number consisting of the two-letter State abbreviation, the last two digits of the water year, and volume number. For example, this volume is identified as "U.S. Geological Survey Water-Data Report MI-82-1." These water-data reports are for sale in paper copy or in microfiche by the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161.

Additional information, including current prices, for ordering specific reports may be obtained from the district chief at the address given on the back of the title page or by telephone, 517-377-1608.

COOPERATION

The U.S. Geological Survey and organizations of the State of Michigan have had cooperative agreements for the systematic collection of streamflow records since 1930, for ground-water levels since 1932, and for water-quality records since 1951. Organizations that assisted in collecting data through cooperative agreement with the Survey are:

State Department of Natural Resources, H. A. Tanner, director, through Water Management Division, L. N. Witte, Chief, and Geological Survey Division, T. R. Segall, Chief.

State Department of State Highways, J. P. Woodford, Director.

Assistance in the form of funds or services was given by the Corps of Engineers, U.S. Army, in collecting records for 33 gaging stations published in this report. Assistance was also furnished by the National Weather Service, National Oceanic Atmospheric Administration, U.S. Department of Commerce, U.S. Environmental Protection Agency, and the National Park Service.

The following organizations aided in collecting records:

Dickinson County Road Commission; Macomb County Board of Supervisors; Oakland County Department of Public Works; Oakland County Drain Commission; Genesee County Drain Commission; Van Buren County; Huron-Clinton Metropolitan Authority; Cities of Ann Arbor, Battle Creek, Coldwater, Imlay City, Ironwood, Jackson, Kalamazoo, Lansing, and Portage; Allied Paper Inc.; American Aggregate Corp; Consumers Power Co.; Cleveland-Cliffs Iron Co.; Detroit Edison Co.; Fisher Body Division of General Motors Corp.; Michigan Power Co.; Michigan Sugar Co.; Peter Eckrich and Sons, Inc.; Upper Peninsula Power Co.; and Wisconsin-Electric Power Co.

Organizations that supplied data are acknowledged in station descriptions.

SUMMARY OF HYDROLOGIC CONDITIONS

In the Upper Peninsula, streamflow during the 1982 water year was above median for the fifth consecutive year. Following deficient runoff in June, heavy showers and thunderstorms in July increased streamflow to the excessive range. Moderate to heavy precipitation during August and September maintained excessive runoff. Runoff during November, December, and June was deficient due to below normal temperatures and precipitation.

The northern part of the Lower Peninsula experienced normal runoff for 11 of the 12 months at the index station Muskegon River at Evart. Above normal temperatures and heavy precipitation on March 30, 31, caused the snow mantle to diminish and runoff to increase to the excessive range during April. This was the first excessive runoff in 14 months.

Runoff in the southern part of the Lower Peninsula was excessive and the monthly mean of 571 cubic feet per second (ft^3/s) was the record high for October. Extremely heavy thunderstorms on September 30, 1981, produced widespread flooding. Precipitation during the last half of October slowed recession and resulted in excessive runoff in November. Heavy precipitation in mid-March caused runoff of the Red Cedar River at East Lansing to be excessive and 218 percent of median. Peak discharges on the St. Joseph River were at or near the 50-year flood frequency. Discharge reached a new maximum, 15,300 ft^3/s at station River Raisin near Monroe, on March 16. This peak discharge approaches a 50-year frequency. Runoff was normal for the remaining months of the water year except during May. Above normal temperatures and below normal precipitation in May resulted in deficient runoff.

In figure 1, the monthly and annual mean discharge is compared with the median discharge during 1951-80 at the three index stations.

Ground-water levels in the Upper Peninsula were normal in the west half and below normal in the east half. In the northern part of the Lower Peninsula, levels ranged from below normal the first half of the year to above normal the latter half. In the southern part, levels were above normal in the southwest and at or below normal elsewhere. No record highs or lows occurred in wells influenced only by natural climatic conditions and with 10 or more years of record.

In 1982, dissolved-solids concentration as recorded by Michigan's NASQAN stations, compare closely with average station values for 1974-81.

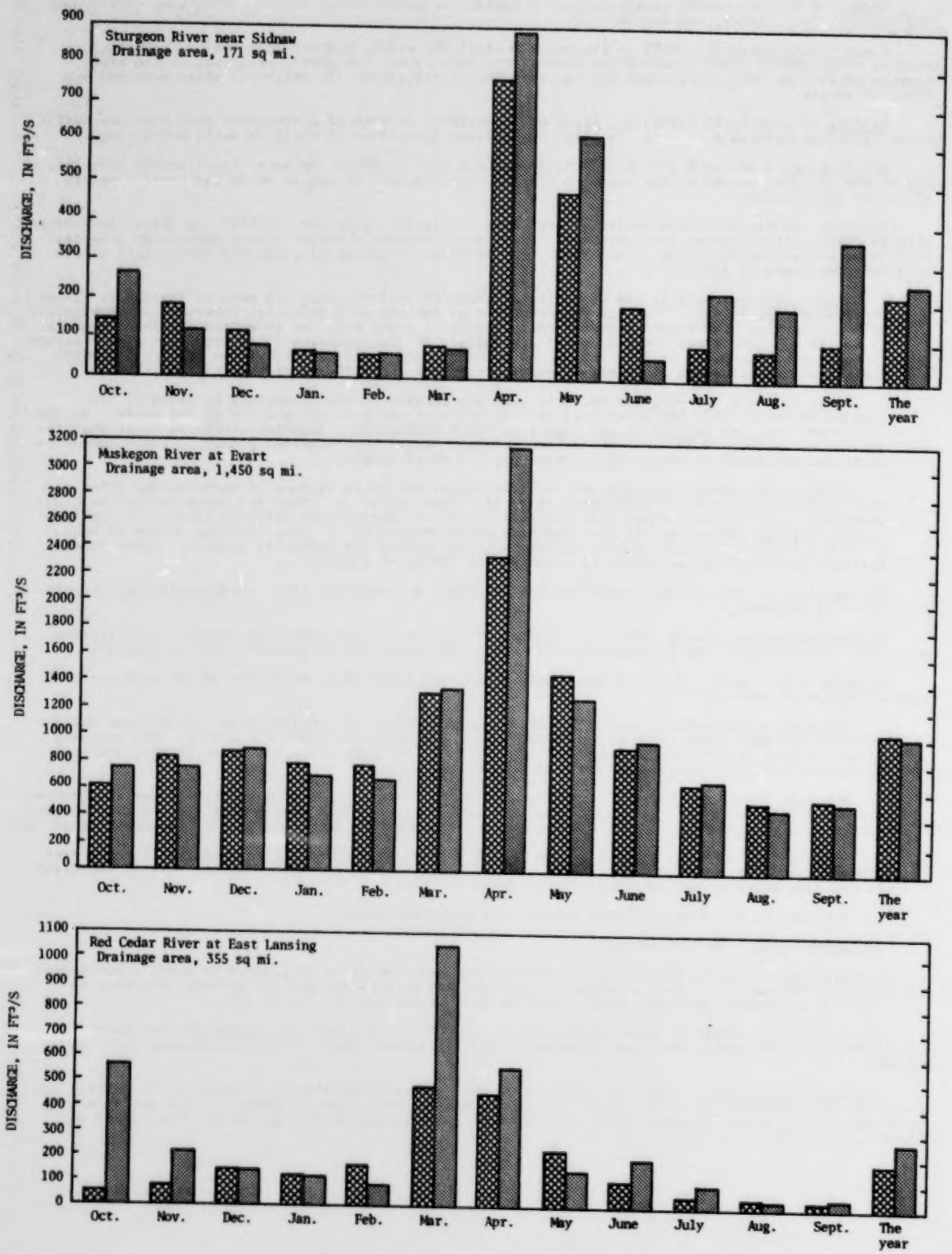
No abnormally high concentrations of common and trace dissolved inorganic constituents were found at any of the NASQAN stations.

DEFINITION OF TERMS

Terms related to streamflow, water-quality, and other hydrologic data, as used in this report, are defined below. See also the table for converting English units to International System of Units (SI) on the inside of the back cover.

Acre-foot (AC-FT, acre-ft) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 43,560 cubic feet or about 326,000 gallons or 1,233 cubic meters.

Adenosine triphosphate (ATP) is the primary energy donor in cellular life process. Its central role in living cells makes it an excellent indicator of the presence of living material in water. A measure of ATP therefore provides a sensitive and rapid estimate of biomass. ATP is reported in micrograms per liter of the original water sample.



Median of monthly and yearly mean discharge for period 1951-80.

Monthly and yearly mean discharge during 1982 water year.

Figure 1. Discharge during 1982 water year compared with median discharge for period 1951-80 for three representative stations.

Algae are mostly aquatic single-celled, colonial, or multi-celled plants, containing chlorophyll and lacking roots, stems, and leaves.

Algal growth potential (AGP) is the maximum algal dry weight biomass that can be produced in a natural water sample under standardized laboratory conditions. The growth potential is the algal biomass present at stationary phase and is expressed as milligrams dry weight of algae produced per liter of sample.

Aquifer is a geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Artesian means confined and is used to describe a well in which the water level stands above the top of the aquifer, tapped by the well. A flowing artesian well is one in which the water level is above the land surface.

Bacteria are microscopic unicellular organisms, typically spherical, rodlike, or spiral and thread-like in shape, often clumped into colonies. Some bacteria cause disease, others perform an essential role in nature in the recycling of materials; for example, by decomposing organic matter into a form available for reuse by plants.

Total coliform bacteria are a particular group of bacteria that are used as indicators of possible sewage pollution. They are characterized as aerobic or facultative anaerobic, gram-negative nonspore-forming, rod-shaped bacteria which ferment lactose with gas formation within 48 hours at 35°C. In the laboratory these bacteria are defined as the organisms which produce colonies within 24 hours when incubated at 35°C ± 1.0°C on M-Endo medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal coliform bacteria are bacteria that are present in the intestines or feces of warm-blooded animals. They are often used as indicators of the sanitary quality of the water. In the laboratory they are defined as all organisms which produce blue colonies within 24 hours when incubated at 44.5°C ± 0.2°C on M-FC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal streptococcal bacteria are bacteria found also in intestines of warm-blooded animals. Their presence in water is considered to verify fecal pollution. They are characterized as gram-positive, cocci bacteria which are capable of growth in brain-heart infusion broth. In the laboratory they are defined as all the organisms which produce red or pink colonies within 48 hours at 35°C ± 1.0°C on M-enterrococcus medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Bed material is the unconsolidated material of which a streambed, lake, pond, reservoir, or estuary bottom is composed.

Biochemical oxygen demand (BOD) is a measure of the quantity of dissolved oxygen, in milligrams per liter, necessary for the decomposition of organic matter by microorganisms, such as bacteria.

Biomass is the amount of living matter present at any given time, expressed as the mass per unit area of volume of habitat.

Ash mass is the mass or amount of residue present after the residue from the dry mass determination has been ashed in a muffle furnace at a temperature of 500°C for 1 hour. The ash mass values of zooplankton and phytoplankton are expressed in grams per cubic meter (g/m^3), and periphyton and benthic organisms in grams per square meter (g/m^2).

Dry mass refers to the mass of residue present after drying in an oven at 60°C for zooplankton and 105°C for periphyton, until the mass remains unchanged. This mass represents the total organic matter, ash and sediment, in the sample. Dry mass values are expressed in the same units as ash mass.

Organic mass or volatile mass of the living substance is the difference between the dry mass and ash mass, and represents the actual mass of the living matter. The organic mass is expressed in the same units as for ash mass and dry mass.

Wet mass is the mass of living matter plus contained water.

Bottom material: See Bed material.

Cells/volume refers to the number of cells of any organism which is counted by using a microscope and grid or counting cell. Many planktonic organisms are multicelled and are counted according to the number of contained cells per sample, usually milliliters (mL) or liters (L).

Cfs-day is the volume of water represented by flow of 1 cubic foot per second for 24 hours. It is equivalent to 86,400 cubic feet, approximately 1.9835 acre-feet, about 646,000 gallons or 2,447 cubic meters.

Chemical oxygen demand (COD) is a measure of the chemically oxidizable material in the water, and furnishes an approximation of the amount of organic and reducing material present. The determined value may correlate with natural water color or with carbonaceous organic pollution from sewage or industrial wastes.

Chlorophyll refers to the green pigments of plants. Chlorophyll a and b are the two most common pigments in plants.

Color unit is produced by one milligram per liter of platinum in the form of the chloroplatinate ion. Color is expressed in units of the platinum-cobalt scale.

Contents is the volume of water in a reservoir or lake. Unless otherwise indicated, volume is computed on the basis of a level pool and does not include bank storage.

Control designates a feature downstream from the gage that determines the stage-discharge relation at the gage. This feature may be a natural constriction of the channel, an artificial structure, or a uniform cross section over a long reach of the channel.

Control structure as used in this report is a structure on a stream or canal that is used to regulate the flow or stage of the stream or to prevent the intrusion of salt water.

Cubic feet per second per square mile (CFSM) is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming that the runoff is distributed uniformly in time and area.

Cubic foot per second (FT^3/s, ft^3/s) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to approximately 7.48 gallons per second or 448.8 gallons per minute or 0.02832 cubic meters per second.

Discharge is the volume of water (or more broadly, volume of fluid plus suspended sediment), that passes a given point within a given period of time.

Mean discharge (MEAN) is the arithmetic mean of individual daily mean discharges during a specific period.

Instantaneous discharge is the discharge at a particular instant of time.

Dissolved refers to the amount of substance present in true chemical solution. In practice, however, the term includes all forms of substance that will pass through a 0.45-micrometer membrane filter, and thus may include some very small (coloidal) suspended particles. Analyses are performed on filtered samples.

Diversity index is a numerical expression of evenness of distribution of aquatic organisms. The formula for diversity index is:

$$\bar{d} = -\sum_{i=1}^{s} \frac{n_i}{n} \log_2 \frac{n_i}{n}$$

Where n_i is the number of individuals per taxon, n is the total number of individuals, and s is the total number of taxa in the sample of the community. Diversity index values range from zero, when all the organisms in the sample are the same, to some positive number, when some or all of the organisms in the sample are different.

Drainage area of a stream at a specific location is that area, measured in a horizontal plane, enclosed by a topographic divide from which direct surface runoff from precipitation normally drains by gravity into the river above the specified point. Figures of drainage area given herein include all closed basins, or noncontribution areas, within the area unless otherwise noted.

Drainage basin is a part of the surface of the earth that is occupied by a drainage system, which consists of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water.

Gage height (G.H.) is the water-surface elevation referred to some arbitrary gage datum. Gage height is often used interchangeably with the more general term "stage", although gage height is more appropriate when used with a reading on a gage.

Gaging station is a particular site on a stream, canal, lake, or reservoir where systematic observations of hydrologic data are obtained.

Hardness of water is a physical-chemical characteristic that is commonly recognized by the increased quantity of soap required to produce lather. It is attributable to the presence of alkalined earths (principally calcium and magnesium) and is expressed as equivalent calcium carbonate ($CaCO_3$).

Hydrologic unit is a geographic area representing part or all of a surface drainage basin or distinct hydrologic feature as delineated by the Office of Water Data Coordination on the State Hydrologic Unit Maps; each hydrologic unit is identified by an 8-digit number.

Metamorphic stage refers to the stage of development that an organism exhibits during its transformation from an immature form to an adult form. This developmental process exists for most insects, and the degree of difference from the immature stage to the adult form varies from relatively slight to pronounced, with many intermediates. Examples of metamorphic stages of insects are egg-larva-adult or egg-nymph-adult.

Methylene blue active substance (MBAS) is a measure of apparent detergents. This determination depends on the formation of a blue color when methylene blue dye reacts with synthetic detergent compounds.

Micrograms per gram (ug/g) is a unit expressing the concentration of a chemical element as the mass (micrograms) of the element sorbed per unit mass (gram) of sediment.

Micrograms per liter (UG/L, ug/L) is a unit expressing the concentration of chemical constituents in solution as mass (micrograms) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter.

Milligrams per liter (MG/L, mg/L) is a unit for expressing the concentration of chemical constituents in solution. Milligrams per liter represent the mass of solute per unit volume (liter) of water. Concentration of suspended sediment also is expressed in mg/L, and is based on the mass of sediment per liter of water-sediment mixture.

National Geodetic Vertical Datum of 1929 (NGVD) is a geodetic datum derived from a general adjustment of the first order level nets of both the United States and Canada. It was formerly called "Sea Level Datum of 1929" or "mean sea level" in this series of reports. Although the datum was derived from the average sea level over a period of many years at 26 tide stations along the Atlantic, Gulf of Mexico, and Pacific Coasts, it does not necessarily represent local mean sea level at any particular place.

Organism is any living entity, such as an insect, phytoplankter, or zooplankter.

Organism count/area refers to the number of organisms collected and enumerated in a sample and adjusted to the number per area habitat, usually square meters (m^2), acres, or hectares. Periphyton benthic organisms, and macrophytes are expressed in these terms.

Organism count/volume refers to the number of organisms collected and enumerated in a sample and adjusted to the number per sample volume, usually milliters (mL) or liters (L). Numbers of planktonic organisms can be expressed in these terms.

Total organism count is the total number of organisms collected and enumerated in any particular sample.

Partial-record station is a particular site where limited streamflow and/or water-quality data are collected systematically over a period of years for use in hydrologic analyses.

Particle-size is the diameter, in millimeters (mm), of suspended sediment or bed material determined by either sieve or sedimentation methods. Sedimentation methods (pipet, bottom-withdrawal tube, visual-accumulation tube) determine fall diameter of particles in either distilled water (chemically dispersed) or in native water (the river water at the time and point of sampling).

Particle-size classification used in this report agrees with recommendations made by the American Geophysical Union Subcommittee on Sediment Terminology.

The classification is as follows:

Classification	Size (mm)	Method of analyses
Clay	0.00024 - 0.004	Sedimentation
Silt	.004 - .062	Sedimentation
Sand	.062 - 2.0	Sedimentation or sieve
Gravel	2.0 - 64.0	Sieve

The particle-size distributions given in this report are not necessarily representative of all particles in transport in the stream. Most of the organic material is removed and the sample is subjected to mechanical and chemical dispersion before analysis in distilled water. Chemical dispersion is not used for native water analysis.

Percent composition is a unit for expressing the ratio of a particular part of a sample or population to the total sample or population, in terms of types, numbers, mass or volume.

Periphyton is the assemblage of microorganisms attached to and growing upon solid surfaces. While primarily consisting of algae, they also include bacteria, fungi, protozoa, rotifers, and other small organisms. Periphyton is a useful indicator of water quality.

Pesticides are chemical compounds used to control undesirable plants and animals. Major categories of pesticides include insecticides, miticides, fungicides, herbicides, and rodenticides. Insecticides and herbicides, which control insects and plants respectively, are the two categories reported.

Picocurie (PC, pCi) is one trillionth (1×10^{12}) of the amount of radioactivity represented by a curie (Ci). A curie is the amount of radio activity that yields 3.7×10^{10} radio active disintegrations per second. A picocurie yields 2.22 dpm (disintegrations per minute).

Plankton is the community of suspended, floating, or weakly swimming organisms that live in the open water of lakes and rivers.

Phytoplankton is the plant part of the plankton. They are usually microscopic and their movement is subject to the water currents. Phytoplankton growth is dependent upon solar radiation and nutrient substances. Because they are able to incorporate as well as release materials to the surrounding water, the phytoplankton have a profound effect upon the quality of the water. They are the primary food producers in the aquatic environment, and are commonly known as algae.

Blue-green algae are a group of phytoplankton organisms having a blue pigment, in addition to the green pigment called chlorophyll. Blue-green algae often cause nuisance conditions in water.

Diatoms are the unicellular or colonial algae having a siliceous shell. Their concentrations are expressed as number of cells/mL of sample.

Green algae have chlorophyll pigments similar in color to those of higher green plants. Some forms produce algal mats or floating "moss" in lakes. Their concentrations are expressed as number of cells/mL of sample.

Zooplankton is the animal part of the plankton. Zooplankton are capable of extensive movements within the water column, and are often large enough to be seen with the unaided eye. Zooplankton are secondary consumers feeding upon bacteria, phytoplankton, and detritus. Because they are the grazers in the aquatic environment, the zooplankton are a vital part of the aquatic food web. The zooplankton community is dominated by small crustaceans and rotifers.

Polychlorinated biphenyls (PCBs) are industrial chemicals that are mixtures of chlorinated biphenyl compounds having various percentages of chlorine. They are similar in structure to organochlorine insecticides.

Primary productivity is a measure of the rate at which new organic matter is formed and accumulated through photosynthetic and chemosynthetic activity of producer organisms (chiefly green plants). The rate of primary production is estimated by measuring the amount of oxygen released (oxygen method) or the amount of carbon assimilated by the plants (carbon method).

Milligrams of carbon per area or volume per unit time [mg C/(m^2·time)] for periphyton and macrophytes and [mg C/(m^3·time)] for phytoplankton are units for expressing primary productivity. They define the amount of carbon dioxide consumed as measured by radioactive carbon (carbon 14). The carbon 14 method is of greater sensitivity than the oxygen light and dark bottle method, and is preferred for use in unenrichod waters. Unit time may be either the hour or day, depending on the incubation period.

Milligrams of oxygen per area or volume per unit time [mg O_2/(m^2·time)] for periphyton and macrophytes and [mg O_2/(m^3·time)] for phytoplankton are the units for expressing primary productivity. They define production and respiration rates as estimated from changes in the measured dissolved oxygen concentration. The oxygen light and dark bottle method is preferred if the rate of primary production is sufficient for accurate measurements to be made within 24 hours. Unit time may be either the hour or day, depending on the incubation period.

Runoff in inches (IN, in) shows the depth to which the drainage area would be covered if all the runoff for a given time period were uniformly distributed on it.

Sediment is solid material that originates mostly from disintegrated rocks and is transported by, suspended in, or deposited from water; it includes chemical and biochemical precipitates and decomposed organic material, such as humus. The quantity, characteristics, and cause of the occurrence of sediment in streams are influenced by environmental factors. Some major factors are degree of slope, length of slope, soil characteristics, land usage, and quantity and intensity of precipitation.

Suspended sediment is the sediment that at any given time is maintained in suspension by the upward components of turbulent currents or that exists in suspension as a colloid.

Suspended-sediment concentration is the velocity-weighted concentration of suspended sediment in the sampled zone (from the water surface to a point approximately 0.3 ft above the bed) expressed as milligrams of dry sediment per liter of water-sediment mixture (mg/L).

Suspended-sediment discharge (tons/day) is the sum of the suspended-sediment discharge and the bed-load discharge. It is the total quantity of sediment, as measured by dry weight or volume, that passes a section during a given time. It is computed by multiplying discharge times mg/L times 0.0027.

Mean concentration is the time-weighted concentration of suspended sediment passing a stream section during a 24-hour day.

Solute is any substance derived from the atmosphere, vegetation, soil, or rocks that is dissolved in water.

Specific conductance is a measure of the ability of a water to conduct an electrical current. It is expressed in micromhos per centimeter at 25°C. Specific conductance is related to the type and concentration of ions in solution and can be used for approximating the dissolved-solids content of the water. Commonly, the concentration of dissolved solids (in milligrams per liter) is about 65 percent of the specific conductance (in micromhos). This relation is not constant from stream to stream, and it may vary in the same source with changes in the composition of the water.

Stage-discharge relation is the relation between gage height (stage) and volume of water per unit of time, flowing in a channel.

Streamflow is the discharge that occurs in a natural channel. Although the term "discharge" can be applied to the flow of a canal, the word "streamflow" uniquely describes the discharge in a surface stream course. The term "streamflow" is more general than "runoff" as streamflow may be applied to discharge whether or not it is affected by diversion or regulation.

Substrate is the physical surface upon which an organism lived.

Natural substrates refers to any naturally occurring emersed or submersed solid surface, such as a rock or tree, upon which an organism lived.

Artificial substrate is a device which is purposely placed in a stream or lake for colonization of organisms. The artificial substrate simplifies the community structure by standardizing the substrate from which each sample is taken. Examples of artificial substrates are basket samplers (made of wire cages filled with clean streamside rocks) and multi-plate samplers (made of hardboard) for benthic organism collection, and plexiglass strips for periphyton collection.

Surface area of a lake is that area outlined on the latest U.S.G.S. topographic map as the boundary of the lake and measured by a planimeter in acres. In localities not covered by topographic maps, the areas are computed from the best maps available at the time planimetered. All areas shown are those for the stage when the planimetered map was made.

Surficial bed material is that part (0.1 to 0.2 ft) of the bed material that is sampled using U.S. Series Bed-Material Samplers.

Suspended (as used in tables of chemical analyses) refers to the amount (concentration) of the total concentration in a water-sediment mixture. The water-sediment mixture is associated with (or sorbed on) that material retained on a 0.45 micrometer filter.

Taxonomy is the division of biology concerned with the classification and naming of organisms. The classification of organisms is based upon a hierarchical scheme beginning with Kingdom and ending with Species at the base. The higher the classification level, the fewer features the organisms have in common. For example, the taxonomy of a particular mayfly, Hexagenia limbata is the following:

Kingdom..... Animal
Phylum.....Arthropoda
Class.....Insecta
Order.....Ephemeroptera
Family.....Ephemeridae
Genus.....Hexageria
Species.....Hexagenia limbata

Time-weighted average is computed by multiplying the number of days in the sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the total number of days. A time-weighted average represents the composition of water that would be contained in a vessel or reservoir that had received equal quantities of water from the stream each day for the year.

Tons per acre-foot indicates the dry mass of dissolved solids in 1 acre-foot of water. It is computed by multiplying the concentration in milligrams per liter by 0.00136.

Tons per day is the quantity of substance in solution or suspension that passes a stream section during a 24-hour day.

Total load (tons) is the total quantity of any individual constituent, as measured by dry mass or volume, that is dissolved in a specific amount of water (discharge) during a given time. It is computed by multiplying the total discharge, times the mg/L of the constituent, times the factor 0.0027, times the number of days.

Weighted average is used in this report to indicate discharge-weighted average. It is computed by multiplying the discharge for a sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the sum of the discharges. A discharge-weighted average approximates the composition of water that would be found in a reservoir containing all the water passing a given location during the water year after thorough mixing in the reservoir.

WDR is used as an abbreviation for "Water-Data Report" in reference to published reports beginning in 1975.

WRD is used as an abbreviation for "Water-Resources Data" in the REVISED RECORDS paragraph to refer to State annual basic-data reports published before 1975.

WSP is used as an abbreviation for "Water-Supply Paper" in references to previously published reports.

DOWNSTREAM ORDER AND STATION NUMBER

Since October 1, 1950, the order of listing hydrologic-station records in Survey reports is in a downstream direction along the main stream. All stations on a tributary entering upstream from a main-stream station are listed before that station. A station on a tributary that enters between two main-stream stations is listed between them. A similar order is followed in listing stations on first rank, second rank, and other ranks of tributaries. The rank of any tributary on which a station is situated with respect to the stream to which it is immediately tr'butary is indicated by an indention in a list of stations in the front of the report. Each indention represents one rank. This downstream order and system of indention show which stations are on tributaries between any two stations and the rank of the tributary on which each station is situated.

As an added means of identification, each hydrologic station, and partial-record station has been assigned a station number. These are in the same downstream order used in this report. In assigning station numbers, no distinction is made between partial-record and continuous-record stations; therefore, the station number for a partial-record station indicates downstream-order position in a list made up of both types of stations. Gaps are left in the series of numbers to allow for new stations that may be established; hence, the numbers are not consecutive. The complete 8-digit number for each station, such as 04058500, which appears just to the left of the station name, includes the 2-digit part number "04" plus the 6-digit downstream order number "058500".

NUMBERING SYSTEM FOR WELLS

Each well is identified by means of (1) a 15-digit number that is based on the grid system of latitude and longitude followed by (2) a local number that is provided for continuity with older reports and for other use as dictated by local needs.

Each well is located as a point on a map by a number based on the universal system of latitude and longitude. In this report, this is the first set of numbers shown for each well. For maximum utility, latitude and longitude numbers are determined to seconds. The first six digits denote degrees, minutes, and seconds of north latitude; the next seven digits denote degrees, minutes, and seconds of west longitude. The last two numbers are sequential numbers assigned in the order that the wells were recorded within a designated latitude-longitude grid.

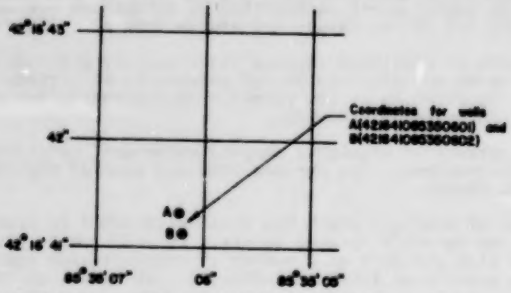


Figure 2. System for numbering wells (latitude and longitude).

The local well number indicates the location of wells within the rectangular subdivision of land with reference to the Michigan meridian and base line. The first two segments of the well number designate township and range, the third segment of the number designates the section and the letters A through D designate successively smaller subdivisions of the section as shown in figure 3. Thus, a well designated as 32N 6E 16CCCB would be located to the nearest 2.5 acres (1 hectare) and would be within the shaded area in section 16. In the event that two or more wells are located in the same 2.5 acre (1 hectare) tract, a sequential number designation follows the letter deesignations--for example, 16CCCB1, 16CCCB2, 16CCCB3, etc.

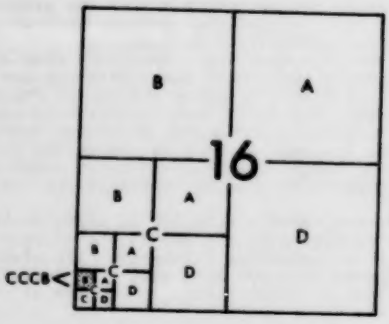


Figure 3. Well numbering system in Michigan.

SPECIAL NETWORKS AND PROGRAMS

Hydrologic bench-mark station is one that provides hydrologic data for a basin in which the hydrologic regimen will likely be governed solely by natural conditions. Data collected at a bench-mark station may be used to separate effects of natural from manmade changes in other basins which have been developed and in which the physiography, climate, and geology are similar to those in the undeveloped bench-mark basin.

National stream-quality accounting network (NASQAN) is a data collection network designed by the U.S. Geological Survey to meet many of the information demands of agencies or groups involved in national or regional water-quality planning and management. Both accounting and broad-scale monitoring objectives have been incorporated in the network design. Areal configuration of the network is based on river-basin accounting units (identified by 8-digit hydrologic-unit numbers) designated by the Office of Water Data Coordination in consultation with the Water Resources Council. Primary objectives of the network are (1) to depict areal variability of streamflow and water-quality conditions nationwide on a year-by-year basis and (2) to detect and assess long-term changes in stream quality.

Pesticide program is a network of regularly sampled water-quality stations where samples are collected to determine the concentration and distribution of pesticides in streams where potential contamination could result from the application of the commonly used insecticides and herbicides. Operation of the network is a Federal interagency activity.

Radiochemical program is a network of regularly sampled water-quality stations where samples are collected to be analyzed for radioisotopes. The streams that are sampled represent major drainage basins in the conterminous United States.

Tritium network is a network of stations which has been established to provide baseline information on the occurrence of tritium in the Nation's surface waters. In addition to the surface-water stations in the network, tritium data are also obtained at a number of precipitation stations. The purpose of the precipitation stations is to provide an estimate sufficient for hydrologic studies of the tritium input to the United States.

EXPLANATION OF STAGE AND WATER-DISCHARGE

Collection and computation of data

The base data collected at gaging stations consist of records of stage and measurements of discharge of streams or canals, and stage, surface area, and contents of lakes or reservoirs. In addition, observations of factors affecting the stage-discharge relation or the stage-capacity relation, weather records, and other information are used to supplement base data in determining the daily flow or volume of water in storage. Records of stage are obtained from either direct readings on a nonrecording gage or from a water-stage recorder that gives either a continuous graph of the fluctuations or a tape punched at selected time intervals. Measurements of discharge are made with a current meter, using the general methods adopted by the Geological Survey. These methods are described in standard textbooks, in Water-Supply Paper 888, and in U.S. Geological Survey Techniques of Water Resources Investigations, book 3, chapter A6.

For stream-gaging stations, rating tables giving the discharge for any stage are prepared from stage-discharge relation curves. If extensions to the rating curves are necessary to express discharge greater than measured, they are made on the basis of indirect measurements of peak discharge (such as slope-area or contracted-opening measurements, computation of flow over dams or weirs), step-backwater techniques, velocity-area studies, and logarithmic plotting. The daily mean discharge is computed from gage heights and rating tables, then the monthly and yearly mean discharge are computed from the daily figures. If the stage-discharge relation is subject to change because of frequent or continual change in the physical features that form the control, the daily mean discharge is computed by the shifting-control method, in which correction factors based on individual discharge measurements and notes by engineers and observers are used in applying the gage heights to the rating tables. If the stage-discharge relation for a station is temporarily changed by the presence of aquatic growth or debris on the control, the daily mean discharge is computed by what is basically the shifting-control method.

At some stream-gaging stations the stage-discharge relation is affected by backwater from reservoirs, tributary streams, or other sources. This necessitates the use of the slope method in which the slope or fall in a reach of the stream is a factor in computing discharge. The slope or fall is obtained by means of an auxiliary gage set at some distance from the base gage. At some stations the stage-discharge relation is affected by changing stage; at these stations the rate of change in stage is used as a factor in computing discharge.

At some northern stream-gaging stations the stage-discharge relation is affected by ice in the winter, and it becomes impossible to compute the discharge in the usual manner. Discharge for periods of ice effect is computed on the basis of the gage-height record and occasional winter discharge measurements. Consideration is given to the available information on temperature and precipitation, notes by gage observers and hydrologist, and comparable records of discharge for other stations in the same or nearby basins.

For a lake or reservoir station, capacity tables giving the contents for any stage are prepared from stage-area relation curves defined by surveys. The application of the stage to the capacity table gives the contents, from which the daily, monthly, or yearly change in contents is computed.

If the stage-capacity curve is subject to changes because of deposition of sediment in the reservoir, periodic resurveys of the reservoir are necessary to define new stage-capacity curves. During the period between reservoir surveys the computed contents may be increasingly in error due to gradual accumulation of sediment.

For some gaging stations there are periods when no gage-height record is obtained or the recorded gage height is so faulty that it cannot be used to compute daily discharge or contents. This happens when the recorder stops or otherwise fails to operate properly, intakes are plugged, the float is frozen in the well, or for various other reasons. For such periods the daily discharges are estimated on the basis of recorded range in stage, prior and subsequent records, discharge measurements, weather records, and comparison with records for other stations in the same or nearby basins. Likewise, daily contents may be estimated on the basis of operator's log, prior and subsequent records, inflow-outflow studies, and other information.

The data in this report generally comprise a description of the station and tabulations of daily and monthly figures. For gaging stations on streams or canals a table showing the daily discharge and monthly and yearly discharge is given. For gaging stations on lakes and reservoirs a monthly summary table of stage and contents or a table showing the daily contents is given. Tables of daily mean gage heights are included for some streamflow stations and for some reservoir stations. Records are published for the water year which begins on October 1 and ends on September 30.

The description of the gaging stations gives the location, drainage area, period of record, notations of revisions of previously published records, type and history of gages, general remarks, average discharge, and extremes of discharge or contents. The location of the gaging station and the drainage area are obtained from the most accurate maps available. River mileage, given under "LOCATION" for some stations, is that determined and used by the Corps of Engineers or other agencies. Periods for which there are published records for the present station or for stations generally equivalent to the present one are given under "PERIOD OF RECORD."

Previously published streamflow records of some stations have been found to be in error on the basis of data or information later obtained. Revisions of such records are usually published along with the current records in one of the annual or compilation reports. In order to make it easier to find such revised records, a paragraph headed "REVISED RECORDS" has been added to the description of all stations for which revised records have been published. Listed therein are all the reports in which revisions have been published, each followed by the water years for which figures are revised in that report. In listing the water years only one number is given; for instance, 1965 stands for the water year Oct.1, 1964, to September 30, 1965. If no daily, monthly, or annual figures of discharge are affected by the revision, the fact is brought out by notations after the year dates as follows: "(M)" means that only the instantaneous maximum discharge was revised; "(m)" that only the instantaneous minimum was revised; and "(P)" that only peak discharges were revised. If the drainage area has been revised, the report in which the revised figure was first published is given. It should be noted that for all stations for which cubic feet per second per square mile and runoff in inches are published, a revision of the drainage area necessitates corresponding revision of all figures based on the drainage area. Revised figures of cubic feet per second per square mile and runoff in inches resulting from a revision of the drainage area only are usually not published in the annual series of reports.

The type of gage currently in use; the datum of the present gage referred to National Geodetic Vertical Datum; and a condensed history of the types, locations, and datums of previous gages used during the period of record are given under "GAGE." National Geodetic Vertical Datum is explained in "DEFINITION OF TERMS" on page 5.

Information pertaining to the accuracy of the discharge records and to conditions which affect the natural flow of the gaging station is given under "REMARKS." For reservoir stations information on the dam forming the reservoir, the capacity, outlet works and spillway, and purpose and use of the reservoir is given under "REMARKS."

The average discharge for the number of years indicated is given under "AVERAGE DISCHARGE"; it is not given for stations having fewer than 5 complete years of record or for stations where changes in water development during the period of record cause the figure to have little significance. Under "EXTREMES" are given first, the extremes for the period of record, second, information available outside the period of record, and last, those for the current year. Unless otherwise qualified, the maximum discharge (or contents) is the instantaneous maximum corresponding to the crest stage obtained by use of a water-stage recorder (graphic or digital), a crest-stage gage, or a nonrecording gage read at the time of the crest. If the maximum gage height did not occur on the same day as the maximum discharge (or contents), it is given separately. Similarly, the minimum is the instantaneous minimum unless otherwise qualified. For some stations peak discharges are listed with "EXTREMES FOR THE CURRENT YEAR"; if they are, all independent peaks, including the maximum for the year, above the selected base with the time of occurrence and corresponding gage heights are published in tabular format. The base discharge, which is given in the table heading, is selected so that an average of about three peaks a year will be presented. Peak discharges are not published for any canals, ditches, drains, or for any stream for which the peaks are subject to substantial control by man. Time of day is expressed in 24-hour local standard time; for example, 12:30 a.m. is 0030, 1:30 p.m. is 1330. The minimums for these stations are published in a separate paragraph following the table of peaks.

The daily table for stream-gaging stations gives the mean discharge for each day and is followed by monthly and yearly summaries. In the monthly summary below the daily table, the line headed "TOTAL" gives the sum of the daily figures. The line headed "MEAN" gives the average flow in cubic feet per second during the month. The lines headed "MAX" and "MIN" give the maximum and minimum daily discharges, respectively, for the month. Discharge for the month also may be expressed in cubic feet per second per square mile (line headed "CFSM"), or in inches (line headed "IN."), or in acre-feet (line headed "AC-FT"). Figures for cubic feet per second per square mile and runoff in inches are omitted if there is extensive regulation or diversion, if the drainage area includes large noncontributing areas, or if the average annual rainfall over the drainage basin is usually less than 20 inches. In the yearly summary below the monthly summary, the figures shown are the appropriate daily discharges for the calendar and water years.

Footnotes to the table of daily discharges are introduced by the word "NOTE." Footnotes are used to indicate periods for which the discharge is computed or estimated by special methods because of no gage-height record, backwater from various sources, or other unusual conditions. Periods of no gage-height record are indicated if the period is continuous for a month or more or includes the maximum discharge for the year. Periods of backwater from an unusual source, of indefinite stage-discharge relation, or of any other unusual condition at the gage site are indicated only if they are a month or more in length and the accuracy of the records is affected. Days on which the stage-discharge relation is affected by ice are not indicated. The methods used in computing discharge for various unusual conditions have been explained in preceding paragraphs.

For most gaging stations on lakes and reservoirs the data presented comprise a description of the station and a monthly summary table of stage and contents. For some reservoirs a table showing daily contents or stage is given. A skeleton table of capacity at given stages is published for most reservoirs for which records are published on a daily basis, but is not published for reservoirs for which only monthly data are given.

Data collected at partial-record stations follow the information for continuous-record sites. Data for partial-record discharge stations are presented in two tables. The first is a table of discharge measurements at low-flow partial-record stations, and the second is a table of annual maximum stage and discharge at crest-stage stations. The tables of partial-record stations are followed by a listing of discharge measurements made at sites other than continuous-record or partial-record stations. Occasionally, a series of discharge measurements are made within a short time period to investigate the seepage gains or losses along a reach of a stream or to determine the low-flow characteristics of an area. Such measurements are also given in special tables following the tables of partial-record stations.

Accuracy of data

The accuracy of streamflow data depends primarily on (1) the stability of the stage-discharge relation or, if the control is unstable, the frequency of discharge measurements, and (2) the accuracy of observations of stage, measurements of discharge, and interpretation of records.

The station description under "REMARKS" states the degree of accuracy of the records. "Excellent" means that about 95 percent of the daily discharges are within 5 percent; "good" within 10 percent; and "fair" within 15 percent. "Poor" means that daily discharges have less than "fair" accuracy.

Figures of daily mean discharge in this report are shown to the nearest hundredth of a cubic foot per second for discharges of less than 1 cfs; to tenths between 1.0 and 10 cfs; to whole numbers between 10 and 1,000 cfs; and to 3 significant figures above 1,000 cfs. The number of significant figures used is based solely on the magnitude of the figure. The same rounding rules apply to discharge figures listed for partial-record stations.

Discharge at many stations, as indicated by the monthly mean, may not reflect natural runoff due to the effects of diversion, consumption, regulation by storage, increase or decrease in evaporation due to artificial causes, or to other factors. For such stations, figures of cubic feet per second per square mile and of runoff in inches are not published unless satisfactory adjustments can be made for diversions, for changes in contents of reservoirs, or for other changes incident to use and control. Evaporation from a reservoir is not included in the adjustments for changes in reservoir contents, unless it is so stated. Even at those stations where adjustments are made, large errors in computed runoff may occur if adjustments or losses are large in comparison with the observed discharge.

Other data available

Information of a more detailed nature than that published for most of the gaging stations, such as observations of water temperatures, discharge measurements, gage-height records, and rating tables, is on file in the district office. Also, most gaging-station records are available in computer-usable form and many statistical analyses have been made.

Information on the availability of unpublished data or statistical analyses may be obtained from the district office.

EXPLANATION OF WATER QUALITY RECORDS

Collection and examination of data

Surface-water samples for analyses usually are collected at or near gaging stations. The quality-of-water records are given immediately following the discharge records at these stations.

The descriptive heading for water-quality records gives the period of record for all water-quality data; the period of daily record for parameters that are measured on a daily basis (specific conductance, pH, dissolved oxygen, water temperature, sediment discharge, etc.); extremes for period of daily record; extremes for the current year; and general remarks.

Information pertaining to the accuracy of some water-quality records are preceeded by a "remark code." The following are explanations of "remark codes" found accompanying water-quality records: "E" estimated; "K" results based on colony outside the acceptable range (NON-IDEAL COLONY COUNT); "ND" not detected.

For ground-water records, no descriptive statements are given; however, the well number, depth of well, date of sampling and/or other pertinent data are given in the table containing the chemical analyses of the ground water.

Water analysis

Most methods for collecting and analyzing water samples are described in the U.S. Geological Survey Techniques of Water Resources Investigations listed on a following page.

One sample can define adequately the water quality at a given time if the mixture of solutes throughout the stream cross section is homogeneous. However, the concentration of solutes at different locations in the cross section may vary widely with different rates of water discharge, depending on the source of material and the turbulence and mixing of the stream. Some streams must be sampled through several vertical sections to obtain a representative sample needed for an accurate mean concentration and for use in calculating load.

Chemical-quality data published in this report are considered to be the most representative values available for the stations listed. The values reported represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. In the rare case where an apparent inconsistency exists between a reported pH value and the relative abundance of carbon dioxide species (carbonate and bicarbonate), the inconsistency is the result of a slight uptake of carbon dioxide from the air by the sample between measurement of pH in the field and determination of carbonate and bicarbonate in the laboratory.

For chemical-quality stations equipped with digital monitors, the records consist of daily maximum, minimum, and mean values for each constituent measured and are based upon hourly punches beginning at 0100 hours and ending at 2400 hours for the day of record. More detailed records (hourly values) may be obtained from the district office.

Water temperature

Water temperatures are measured at most of the water-quality stations. In addition, water temperatures are taken at time of discharge measurements for water-discharge stations. For stations where water temperatures are taken manually once or twice daily, the water temperatures are taken at about the same time each day. Large streams have a small daily temperature change; shallow streams may have a daily range of several degrees and may follow closely the changes in air temperature. Some streams may be affected by waste-heat discharge.

At stations where recording instruments are used, either mean temperatures or maximum and minimum temperatures for each day are published.

Sediment

Suspended-sediment concentrations are determined from samples collected by using depth-integrating samplers. Samples usually are obtained at several verticals in the cross section, or a single sample may be obtained at a fixed point and a coefficient applied to determine the mean concentration in the cross sections.

During periods of rapidly changing flow or rapidly changing concentration, samples may have been collected more frequently (twice daily or, in some instances, hourly). The published sediment discharges for days of rapidly changing flow or concentration were computed by the subdivided day method (time-discharge weighted average). Therefore, for those days when the published sediment discharge value differs from the value computed as the product of discharge times mean concentration times 0.0027, the reader can assume that the sediment discharge for that day was computed by the subdivided day method. For periods when no samples are collected, daily loads of suspended sediment were estimated on the basis of water discharge, sediment concentrations observed immediately before and after the periods, and suspended-sediment loads for other periods of similar discharge.

At other stations, suspended-sediment samples are collected periodically at many verticals in the stream cross section. Although data collected periodically may represent conditions only at the time of observation, such data are useful in establishing seasonal relations between quality and streamflow in predicting long-term sediment-discharge characteristics of the stream.

In addition to the records of the quantities of suspended sediment, records of periodic measurements of the particle-size distribution of the suspended sediment and bed material are included.

EXPLANATION OF GROUND-WATER LEVEL RECORDS

Collection of the data

Only ground-water level data from a basic national network of observation wells are published herein. This basic network contains observation wells so located (figure 9) that the most significant data are obtained from the fewest wells in the most important aquifers.

Each well is identified by means of (1) a 15-digit number that is based on latitude and longitude, and (2) a local number that is provided for local needs. See figures 2 and 3.

Measurements are made in many types of wells under varying conditions of access and of different temperatures, hence neither the method of measurement nor the equipment can be standardized. At each observation well, however, the equipment and techniques used are those that will insure that measurements at each well are consistent.

Water-level measurements in this report are given in feet with reference to either mean sea level (msl) or land-surface datum (lsd). Mean sea level is the datum plane on which the national network of precise levels is based; land-surface datum is a datum plane that is approximately at land surface at each well. If known, the altitude of the lands-surface datum above mean sea level is given in the well description. The height of the measuring point (MP) above or below land-surface datum is given in each well description. Water levels in wells equipped with recording gages are reported for every fifth day and the end of each month (eom).

Water levels are reported to as many significant figures as can be justified by the local conditions. For example, in a measurement of a depth to water of several hundred feet, the error of determining the absolute value of the total depth to water may be a few tenths of a foot, whereas the error in determining the net change of water level between successive measurements may be only a hundredth or a few hundredths of a foot. For lesser depths to water, the accuracy is greater. Accordingly, most measurements are reported to a hundredth of a foot, but some are given only to a tenth of a foot or a larger unit.

PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS

Thirty-four manuals by the U.S. Geological Survey have been published to date in the series on techniques describing procedures for planning and executing specialized work in water-resources investigations. The material is grouped under major subject headings called books and is further divided into sections and chapters. For example, Section A of Book 3 (Applications of Hydraulics) is on surface water. The chapter, the unit of publication, is limited to a narrow field of subject matter. This format permits flexibility in revision and publication as the need arises. The reports listed below are for sale by the U.S. Geological Survey, Branch of Distribution, 1200 South Eads Street, Arlington, VA 22202 (authorized agent of the Superintendent of Documents, Government Printing Office).

NOTE: When ordering any of these publications, please give the title, book number, chapter number, and "U.S. Geological Survey Techniques of Water-Resources Investigations".

1-D1. *Water temperature--influential factors, field measurement, and data presentation*, by H. H. Stevens, Jr., J. F. Ficke, and G. F. Smoot: USGS--TWRI Book 1, Chapter D1. 1975. 65 pages.

1-D2. *Guidelines for collection and field analysis of ground-water samples for selected unstable constituents*, by W. W. Wood: USGS--TWRI Book 1, Chapter D2. 1976. 24 pages.

2-D1. *Application of surface geophysics to ground-water investigations*, by A. A. R. Zohdy, G. P. Eaton, and D. R. Mabey: USGS--TWRI Book 2, Chapter D1. 1974. 116 pages.

2-E1. *Application of borehole geophysics to water-resources investigations*, by W. S. Keys and L. M. MacCary: USGS--TWRI Book 2, Chapter E1. 1971. 126 pages.

3-A1. *General field and office procedures for indirect discharge measurements*, by M. A. Benson and Tate Dalrymple: USGS--TWRI Book 3, Chapter A1. 1967. 30 pages.

3-A2. *Measurement of peak discharge by the slope-area method*, by Tate Dalrymple and M. A. Benson: USGS--TWRI Book 3, Chapter A2. 1967. 12 pages.

3-A3. *Measurement of peak discharge at culverts by indirect methods*, by G. L. Bodhaine: USGS--TWRI Book 3, Chapter A3. 1968. 60 pages.

3-A4. *Measurement of peak discharge at width contractions by indirect methods*, by H. F. Matthai: USGS--TWRI Book 3, Chapter A4. 1967. 44 pages.

3-A5. *Measurement of peak discharge at dams by indirect methods*, by Harry Hulsing: USGS--TWRI Book 3, Chapter A5. 1967. 29 pages.

3-A6. *General procedure for gaging streams*, by R. W. Carter and Jacob Davidian: USGS--TWRI Book 3, Chapter A6. 1968. 13 pages.

3-A7. *Stage measurements at gaging stations*, by T. J. Buchanan and W. P. Somers: USGS--TWRI Book 3, Chapter A7. 1968. 28 pages.

3-A8. *Discharge measurements at gaging stations*, by T. J. Buchanan and W. P. Somers: USGS--TWRI Book 3, Chapter A8. 1969. 65 pages.

3-A11. *Measurement of discharge by moving-boat method*, by G. F. Smoot and C. E. Novak: USGS--TWRI Book 3, Chapter A11. 1969. 22 pages.

3-B1. *Aquifer-test design, observation, and data analysis*, by R. W. Stallman: USGS--TWRI Book 3, Chapter B1. 1971. 26 pages.

3-B2. *Introduction to ground-water hydraulics, a programed text for self-instruction*, by G. D. Bennett: USGS--TWRI Book 3, Chapter B2. 1976. 172 pages.

3-C1. *Fluvial sediment concepts*, by H. P. Guy: USGS--TWRI Book 3, Chapter C1. 1970. 55 pages.

3-C2. *Field methods for measurement of fluvial sediment*, by H. P. Guy and V. W. Norman: USGS--TWRI Book 3, Chapter C2. 1970. 59 pages.

3-C3. *Computation of fluvial-sediment discharge*, by George Porterfield: USGS--TWRI Book 3, Chapter C3. 1972. 66 pages.

4-A1. *Some statistical tools in hydrology*, by H. C. Riggs: USGS--TWRI Book 4, Chapter A1. 1968. 39 pages.

4-A2. *Frequency curves*, by H. C. Riggs: USGS--TWRI Book 4, Chapter A2. 1968. 15 pages.

4-B1. *Low-flow investigations*, by H. C. Riggs: USGS--TWRI Book 4, Chapter B1. 1972. 18 pages.

4-B2. *Storage analyses for water supply*, by H. C. Riggs and C. H. Hardison: USGS--TWRI Book 4, Chapter B2. 1973. 20 pages.

4-B3. *Regional analyses of streamflow characteristics*, by H. C. Riggs: USGS--TWRI Book 4, Chapter B3. 1973. 15 pages.

4-D1. *Computation of rate and volume of stream depletion by wells*, by C. T. Jenkins: USGS--TWRI Book 4, Chapter D1. 1970. 17 pages.

5-A1. *Methods for determination of inorganic substances in water and fluvial sediments*, by M. W. Skougstad and others, editors: USGS--TWRI Book 5, Chapter A1. 1979. 626 pages.

5-A2. *Determination of minor elements in water by emission spectroscopy*, by P. R. Barnett and E. C. Mallory, Jr.: USGS--TWRI Book 5, Chapter A2. 1971. 31 pages.

5-A3. *Methods for analysis of organic substances in water*, by D. F. Goerlitz and Eugene Brown: USGS--TWRI Book 5, Chapter A3. 1972. 40 pages.

5-A4. *Methods for collection and analysis of aquatic biological and microbiological samples*, edited by P. E. Greeson, T. A. Ehlke, G. A. Irwin, B. W. Lium, and K. V. Slack: USGS--TWRI Book 5, Chapter A4. 1977. 332 pages.

5-A5. *Methods for determination of radioactive substances in water and fluvial sediments*, by L. L. Thatcher, V. J. Janzer, and K. W. Edwards: USGS--TWRI Book 5, Chapter A5. 1977. 95 pages.

5-C1. *Laboratory theory and methods for sediment analysis*, by H. P. Guy: USGS--TWRI Book 5, Chapter C1. 1969. 58 pages.

7-C1. *Finite difference model for aquifer simulation in two dimensions with results of numerical experiments*, by P. C. Trescott, G. F. Pinder, and S. P. Larson: USGS--TWRI Book 7, Chapter C1. 1976. 116 pages.

7-C2. *Computer model of two-dimensional solute transport and dispersion in ground water*, by L. F. Konikow and J. D. Bredehoeft: USGS--TWRI Book 7, Chapter C2. 1978. 90 pages.

8-A1. *Methods of measuring water levels in deep wells*, by M. S. Garber and F. C. Koopman: USGS--TWRI Book 8, Chapter A1. 1968. 23 pages.

8-B2. *Calibration and maintenance of vertical-axis type current meters*, by G. F. Smoot and C. E. Novak: USGS--TWRI Book 8, Chapter B2. 1968. 15 pages.

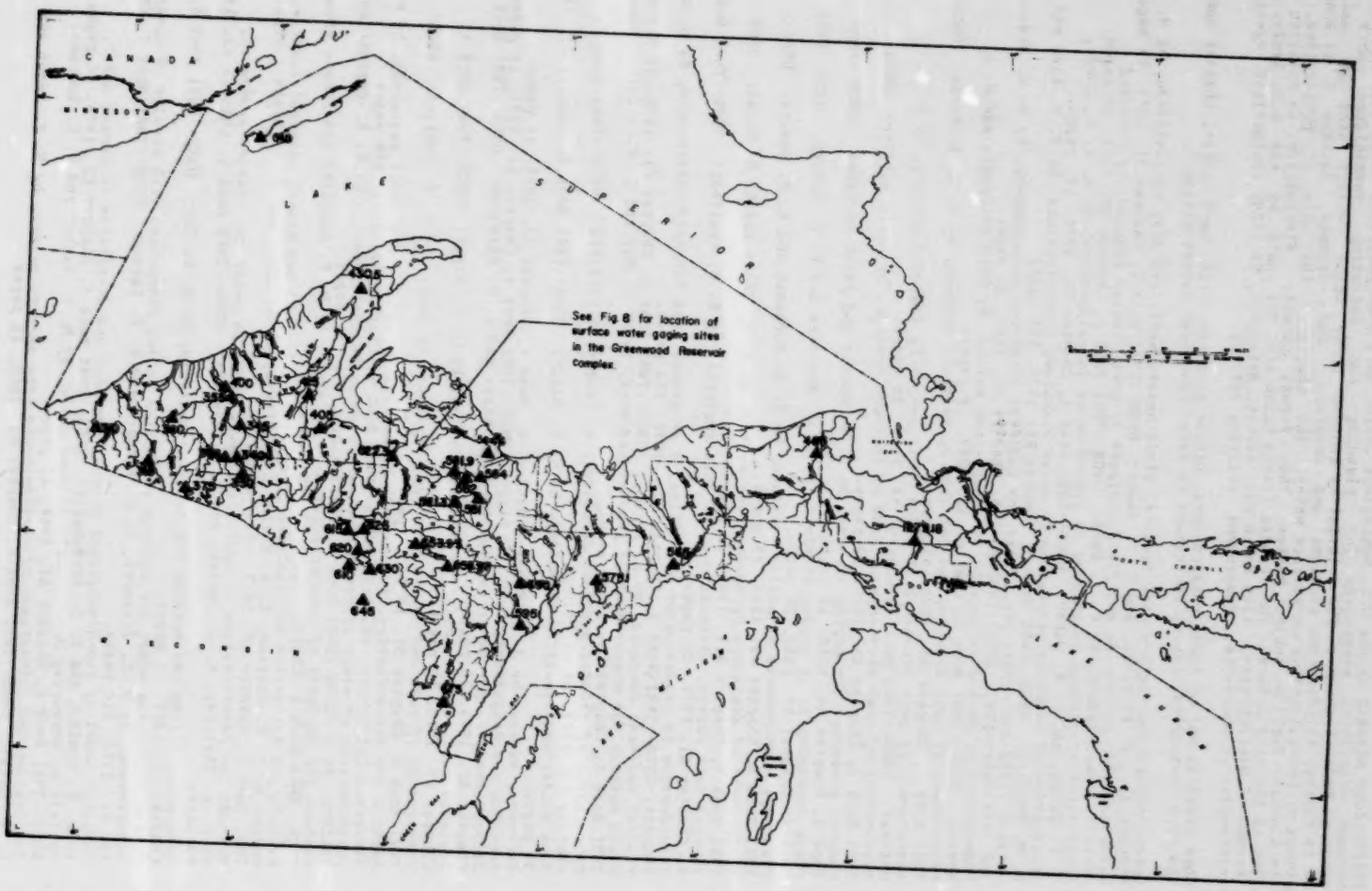


FIGURE 4.--Map showing identification number and location of gaging stations in Upper Peninsula of Michigan.

FIGURE 5.--Map showing identification number and location of gaging stations in Lower Peninsula of Michigan.

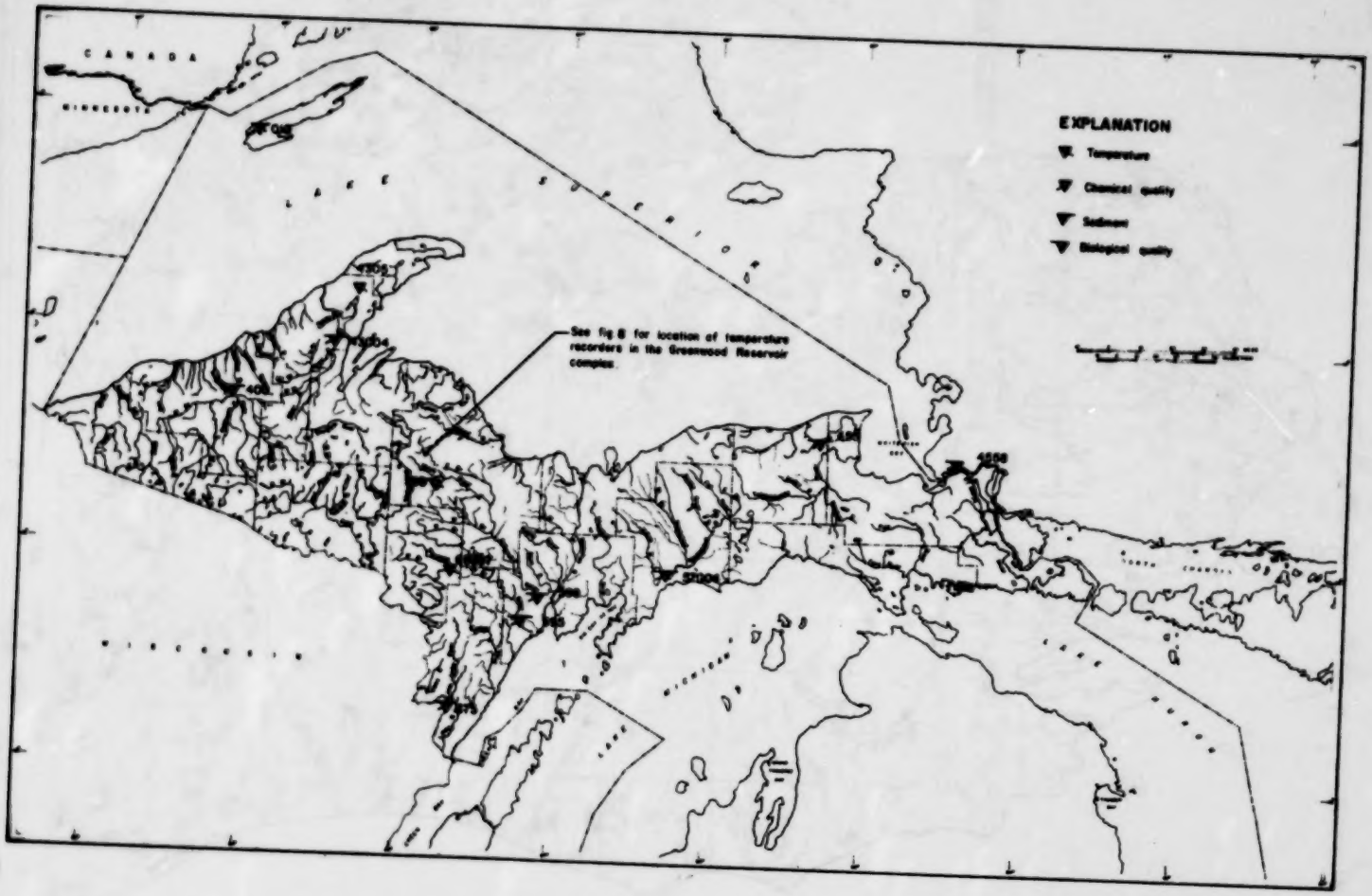


FIGURE 6.--Map showing identification number and location of water-quality stations in Upper Peninsula of Michigan.

FIGURE 7.--Map showing identification number and location of water-quality stations in Lower Peninsula of Michigan.

04001000 WASHINGTON CREEK AT WINDIGO, MI
(Hydrologic bench-mark station)

LOCATION.--Lat 47°55'23", long 89°08'42", in NW¼ sec.28, T.64 N., R.38 W., Keweenaw County, Isle Royale National Park, Hydrologic Unit 04020300, on left bank 0.8 mi (1.3 km) northeast of Windigo, and 35 mi (56 km) southwest of Rock Harbor.

DRAINAGE AREA.--13.2 mi² (34.2 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder and concrete control. Altitude of gage is 605 ft (184 m) from topographic map (nearest 5 ft).

REMARKS.--Water-discharge records good except those above 80 ft³/s (2.27 m³/s), which are fair, those for winter period and those for period of no gage-height record, Jan. 1 to Feb. 6, which are poor. ERTS satellite telemeter and recording rain gage at station. Capacity rain gage located near mouth. Hydrologic bench-mark stations are installed in specially selected areas where water resources have not yet been affected by works of man. Continuous records of natural hydrologic conditions, such as streamflow and water quality, will make possible assessment of changes which occur as a result of changes in climate and other natural factors. These data will provide a frame of reference against which hydrologic changes wrought by man may be evaluated.

AVERAGE DISCHARGE.--18 years, 17.3 ft³/s (0.490 m³/s), 17.80 in/yr (452 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 480 ft³/s (13.6 m³/s) May 1, 1972, gage height, 6.82 ft (2.079 m), from rating curve extended above 160 ft³/s (4.53 m³/s) based on runoff characteristics of nearby stations, maximum gage height, 6.88 ft (2.097 m) Jan. 13, 1975, backwater from ice; minimum daily discharge, 0.44 ft³/s (0.012 m³/s) Aug. 25, 1977; minimum gage height, 2.55 ft (0.777 m) Aug. 29, 30, 31, Sept. 2, 3, 7, 9, 10, 11, 12, 1976.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 110 ft³/s (3.12 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Apr. 17	1000	162	4.59	5.12	1.561	Apr. 25	2200	*376	10.6	*6.33	1.929

Minimum discharge, 0.94 ft³/s (0.027 m³/s) Aug. 13, 14, 15, 17, 18.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14	13	2.6	1.3	1.3	1.4	33	75	8.2	1.5	1.3	3.9
2	10	12	2.6	1.3	1.3	1.4	31	70	7.5	1.4	1.3	3.8
3	7.7	10	2.5	1.3	1.3	1.4	35	63	6.5	1.5	1.9	3.5
4	7.1	9.4	2.4	1.3	1.3	1.3	45	62	5.8	1.9	1.9	2.8
5	6.8	9.0	2.3	1.3	1.3	1.3	42	61	5.5	2.0	1.7	2.5
6	6.9	8.1	2.3	1.3	1.3	1.3	38	56	5.0	5.4	1.5	2.2
7	5.8	7.0	2.2	1.3	1.2	1.3	35	55	4.6	9.7	2.3	2.0
8	4.4	6.6	2.1	1.3	1.2	1.3	33	45	4.3	7.5	2.0	1.9
9	3.9	5.9	2.0	1.3	1.2	1.2	31	37	4.2	5.9	1.8	1.8
10	3.7	5.3	2.0	1.3	1.2	1.2	29	43	6.3	6.5	1.5	1.8
11	3.7	5.1	1.9	1.3	1.2	1.2	28	50	5.9	20	1.2	1.9
12	3.5	4.9	1.9	1.3	1.2	1.5	32	45	5.5	19	1.1	2.7
13	3.2	4.6	1.8	1.3	1.2	2.0	40	52	4.8	14	1.0	2.9
14	4.0	4.4	1.7	1.3	1.2	2.5	50	71	4.5	10	1.0	2.3
15	4.7	4.3	1.7	1.3	1.2	3.5	84	59	4.2	8.0	.97	2.0
16	4.2	4.1	1.6	1.3	1.3	4.0	139	48	3.8	7.4	1.1	2.0
17	5.6	4.0	1.6	1.3	1.3	3.5	154	40	4.1	7.0	.99	2.9
18	10	3.8	1.6	1.3	1.4	3.3	128	40	3.9	6.0	1.0	3.1
19	8.2	3.4	1.5	1.3	1.5	3.0	102	38	3.5	4.9	13	2.7
20	8.7	3.1	1.5	1.3	1.4	2.6	88	33	3.2	4.1	7.3	2.6
21	9.2	2.7	1.5	1.3	1.4	2.4	73	28	3.0	3.6	6.7	2.4
22	8.3	2.6	1.6	1.3	1.4	2.2	68	24	2.7	3.1	12	2.0
23	8.4	2.3	1.6	1.3	1.3	2.1	76	21	2.4	2.5	12	2.3
24	7.4	2.3	1.7	1.3	1.4	2.0	149	19	2.5	2.2	9.0	3.1
25	7.5	2.5	1.6	1.3	1.4	1.9	298	17	2.8	2.0	7.1	5.5
26	7.6	2.7	1.5	1.3	1.4	1.9	232	15	2.3	1.8	6.0	6.0
27	7.3	3.0	1.5	1.3	1.4	1.8	124	13	2.1	1.6	4.8	7.8
28	8.5	3.0	1.4	1.3	1.4	1.8	95	12	2.1	1.5	4.0	12
29	11	2.8	1.4	1.3	---	1.8	90	11	2.0	1.4	3.6	21
30	16	2.7	1.4	1.3	---	4.0	84	9.4	1.7	1.4	3.4	27
31	16	---	1.3	1.3	---	30	---	8.3	---	1.4	3.1	---
TOTAL	233.3	154.6	56.3	40.3	36.6	92.1	2486	1220.7	124.9	166.2	117.56	140.4
MEAN	7.53	5.15	1.82	1.30	1.31	2.97	82.9	39.4	4.16	5.36	3.79	4.68
MAX	16	13	2.6	1.3	1.5	30	298	75	8.2	20	13	27
MIN	3.2	2.3	1.3	1.3	1.2	1.2	28	8.3	1.7	1.4	.97	1.8
CFSM	.57	.39	.14	.10	.10	.23	6.28	2.99	.32	.41	.29	.36
IN.	.66	.44	.16	.11	.10	.26	7.01	3.44	.35	.47	.33	.40

CAL YR 1981 TOTAL 4847.56 MEAN 13.3 MAX 170 MIN .68 CFSM 1.01 IN 13.66
WTR YR 1982 TOTAL 4868.96 MEAN 13.3 MAX 298 MIN .97 CFSM 1.01 IN 13.72

04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1965 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1964 to current year.

INSTRUMENTATION.--Temperature recorder since Oct. 20, 1964.

REMARKS.--In addition to the temperature recorder record, samples were collected five times during the year. Temperature recorder malfunctioned Oct. 24-27, Apr. 23-25. Clock stopped May 7-12 (range in temperature 6.5 to 8.5°C), Aug. 9 (range in temperature 12.0 to 13.5°C).

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 22.0°C July 26, 30, 31, 1970, July 18, Aug. 1, 1975, July 20, 1977, July 8, 1981; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 18.5°C July 17; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)
OCT											
20...	1350	8.8	132	7.8	3.5	12.3	95	50	194	60	15
MAY											
12...	1300	46	67	7.0	7.5	10.7	92	K2	110	33	4.0
JUN											
10...	1330	6.5	116	--	10.5	9.8	90	51	K2500	60	5.0
AUG											
10...	1400	1.6	176	7.7	13.0	9.6	93	310	310	88	4.0
SEP											
22...	1430	2.2	166	7.7	10.0	11.1	100	K26	--	84	.00

DATE	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CARBON, ORGANIC TOTAL (MG/L AS C)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)
OCT											
20...	16	4.8	3.2	10	.6	45	8.0	--	13	.1	<.01
MAY											
12...	9.0	2.6	1.5	9	.3	29	7.0	--	16	.1	<.01
JUN											
10...	16	4.8	3.0	10	.3	55	5.0	11	--	--	--
AUG											
10...	24	6.9	5.4	12	.2	84	4.0	6.9	--	--	--
SEP											
22...	23	6.5	4.2	10	.1	85	5.0	14	--	--	--

DATE	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)
OCT											
20...	2.9	<.1	12	101	75	.14	2.4	<.10	<.10	--	.010
MAY											
12...	1.2	<.1	7.6	78	47	.11	9.7	<.10	<.10	.030	.020
JUN											
10...	2.3	<.1	10	114	74	.16	2.0	<.10	<.10	--	.020
AUG											
10...	5.3	<.1	14	142	110	.19	.61	<.10	<.10	.010	<.010
SEP											
22...	4.7	<.1	13	127	108	.17	.75	<.10	<.10	--	.050

STREAMS TRIBUTARY TO LAKE SUPERIOR

04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982--CONTINUED

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS NH4)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT											
20...	.01	--	.28	--	--	<.010	--	<.010	18	.43	93
MAY											
12...	.03	.55	.61	.04	.57	--	.03	.020	8	.99	100
JUN											
10...	.03	.08	.80	.70	.10	.010	.03	<.010	14	.25	89
AUG											
10...	.01	--	.50	.10	.40	.010	.03	<.010	0	.00	--
SEP											
22...	.06	1.1	1.30	.20	1.1	--	.06	.060	2	.01	100

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)
OCT											
20...	1350	7	1	<50	10	1	<1	1	10	3	3
MAY											
12...	1300	1	<1	<100	5	<1	<1	<1	30	<1	<3

DATE	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	COPPER, DISSOLVED (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LEAD, DISSOLVED (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)
OCT										
20...	10	10	400	250	--	10	4	10	8	.1
MAY										
12...	6	<10	280	130	2	<10	<4	10	4	<.1

DATE	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	SELENIUM, TOTAL (UG/L AS SE)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)
OCT										
20...	.1	12	<1	<1	<1	<1	31	6.0	20	4
MAY										
12...	<.1	<10	<1	<1	<1	<1	16	<6.0	20	<3

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982--CONTINUED

RADIOCHEMICAL ANALYSES

DATE	TIME	GROSS ALPHA, DIS-SOLVED (UG/L AS U-NAT)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT)	GROSS BETA, DIS-SOLVED (PCI/L AS CS-137)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137)	GROSS BETA, DIS-SOLVED (PCI/L AS SR/YT-90)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/YT-90)	RADIUM 226, DIS-SOLVED, RADON METHOD (PCI/L)	URANIUM DIS-SOLVED, EXTRAC-TION (UG/L)
OCT									
20...	1350	<2.2	<.4	1.9	<.5	1.8	<.5	.18	.05

PESTICIDE ANALYSES

DATE	TIME	PCB, TOTAL (UG/L)	PCB, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	ALDRIN, TOTAL (UG/L)	ALDRIN, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	CHLOR-DANE, TOTAL (UG/L)	CHLOR-DANE, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	DDD, TOTAL (UG/L)	DDD, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	DDE, TOTAL (UG/L)	DDE, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	DDT, TOTAL (UG/L)
OCT												
20...	1350	<.10	1	<.01	<.1	<.10	<1.0	<.01	<.1	<.01	<.1	<.01

DATE	DDT, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	DI-AZINON, TOTAL (UG/L)	DI-ELDRIN TOTAL (UG/L)	DI-ELDRIN, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	ENDO-SULFAN, TOTAL (UG/L)	ENDO-SULFAN, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	ENDRIN, TOTAL (UG/L)	ENDRIN, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	ETHION, TOTAL (UG/L)	HEPTA-CHLOR, TOTAL (UG/L)	HEPTA-CHLOR, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	HEPTA-CHLOR EPOXIDE TOTAL (UG/L)
OCT												
20...	<.1	<.01	<.01	<.1	<.01	<.1	<.01	<.1	<.01	<.01	<.1	<.01

DATE	HEPTA-CHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG)	LINDANE TOTAL (UG/L)	LINDANE TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	MALA-THION, TOTAL (UG/L)	METH-OXY-CHLOR, TOTAL (UG/L)	METH-OXY-CHLOR, TOT. IN BOTTOM MATL. (UG/KG)	METHYL PARA-THION, TOTAL (UG/L)	METHYL TRI-THION, TOTAL (UG/L)	NAPH-THA-LENES, POLY-CHLOR. TOTAL (UG/L)	PCN, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	MIREX, TOTAL (UG/L)
OCT											
20...	<.1	<.01	<.1	<.01	<.01	<.1	<.01	<.01	<.10	<1.0	<.01

DATE	MIREX, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	PARA-THION, TOTAL (UG/L)	PER-THANE IN BOTTOM MATERIL (UG/KG)	PER-THANE TOTAL (UG/L)	TOX-APHENE, TOTAL (UG/L)	TOXA-PHENE, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	TOTAL TRI-THION (UG/L)	2,4-D, TOTAL (UG/L)	2,4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
OCT											
20...	<.1	<.01	<.10	<.01	< 1	<1.0	<.01	<.01	<.01	<.01	<.01

04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	6.0	5.0	5.0	4.0	.0	.0	.0	.0	.0	.0	.0	.0
2	5.0	4.5	4.0	3.5	.0	.0	.0	.0	.0	.0	.0	.0
3	4.5	4.0	3.5	3.0	.0	.0	.0	.0	.0	.0	.0	.0
4	5.0	4.5	3.0	3.0	.0	.0	.0	.0	.0	.0	.0	.0
5	6.0	5.0	4.0	3.0	.0	.0	.0	.0	.0	.0	.0	.0
6	7.0	6.0	4.0	3.0	.0	.0	.0	.0	.0	.0	.0	.0
7	7.0	6.0	3.0	2.5	.0	.0	.0	.0	.0	.0	.0	.0
8	6.0	5.0	2.5	2.5	.0	.0	.0	.0	.0	.0	.0	.0
9	6.5	5.5	2.5	1.5	.0	.0	.0	.0	.0	.0	.0	.0
10	6.5	6.5	2.0	1.5	.0	.0	.0	.0	.0	.0	.0	.0
11	7.0	6.5	2.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0
12	7.0	6.5	2.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0
13	7.0	6.5	2.5	2.0	.0	.0	.0	.0	.0	.0	.0	.0
14	8.0	7.0	3.5	2.5	.0	.0	.0	.0	.0	.0	.0	.0
15	8.0	7.0	4.5	3.5	.0	.0	.0	.0	.0	.0	.0	.0
16	7.0	5.0	4.5	4.5	.0	.0	.0	.0	.0	.0	.0	.0
17	6.0	6.0	4.5	4.5	.0	.0	.0	.0	.0	.0	.0	.0
18	6.0	4.5	4.5	3.5	.0	.0	.0	.0	.0	.0	.0	.0
19	4.5	3.5	3.5	2.0	.0	.0	.0	.0	.0	.0	.0	.0
20	3.5	3.5	2.0	1.0	.0	.0	.0	.0	.0	.0	.0	.0
21	3.5	3.0	1.0	.5	.0	.0	.0	.0	.0	.0	.0	.0
22	3.0	2.0	.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
23	2.0	1.5	.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
24	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
26	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
27	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
28	2.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
29	3.0	2.0	.0	.0	.0	.0	.0	.0	---	---	.0	.0
30	4.0	3.0	.0	.0	.0	.0	.0	.0	---	---	.0	.0
31	5.0	4.0	---	---	.0	.0	.0	.0	---	---	.0	.0
MONTH			5.0	.0	.0	.0	.0	.0	.0	.0	.0	.0

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	.0	.0	5.5	4.0	11.0	9.5	16.0	11.5	16.5	13.5	13.0	11.5
2	.0	.0	6.5	5.0	12.0	9.0	16.5	12.0	13.5	12.0	13.5	12.5
3	.0	.0	6.5	6.0	12.0	8.0	15.5	13.0	13.5	12.5	13.0	12.0
4	.0	.0	7.0	6.5	13.0	8.5	14.5	12.5	14.5	13.5	13.0	10.5
5	.0	.0	7.5	7.0	14.5	9.5	17.0	13.0	15.0	13.0	13.0	12.5
6	.0	.0	7.5	6.5	14.0	11.0	17.0	15.5	14.5	13.5	12.5	10.0
7	.0	.0	---	---	15.0	12.0	16.0	15.0	15.0	13.5	10.5	9.0
8	.0	.0	---	---	14.5	12.0	15.5	13.0	15.0	13.5	13.0	10.0
9	.0	.0	---	---	13.0	11.5	15.0	13.0	---	---	14.0	12.5
10	.0	.0	---	---	12.0	10.5	13.0	13.0	14.5	11.5	14.0	13.5
11	.0	.0	---	---	12.0	10.0	13.0	12.5	14.5	11.0	15.0	14.0
12	.0	.0	---	---	13.5	10.0	15.0	12.5	15.0	11.0	15.5	15.0
13	.0	.0	9.0	7.5	14.5	11.0	16.0	13.5	14.0	12.0	15.5	14.0
14	.0	.0	10.0	7.0	14.5	12.0	17.0	15.0	16.5	12.5	14.0	12.5
15	.0	.0	10.5	9.5	15.0	12.0	17.0	15.0	16.5	13.0	12.5	10.0
16	.0	.0	10.5	10.0	14.0	10.5	17.5	15.5	18.0	14.5	10.0	8.5
17	.0	.0	10.0	9.5	14.5	11.0	18.5	16.0	17.0	13.5	11.0	10.0
18	.0	.0	10.5	9.5	13.5	11.0	17.0	14.0	15.5	13.0	11.0	9.0
19	.0	.0	10.5	10.5	14.0	11.0	16.5	13.5	16.0	14.0	11.0	9.5
20	.0	.0	11.0	8.5	15.5	11.5	16.5	13.0	16.0	14.0	10.5	9.5
21	.0	.0	11.0	8.0	14.5	12.0	16.5	15.0	15.0	13.0	10.0	8.0
22	.0	.0	11.0	7.5	14.0	11.0	17.5	14.0	15.5	14.5	9.0	7.0
23	---	---	12.5	8.0	15.0	11.0	17.5	14.0	16.0	14.5	8.5	8.0
24	---	---	13.0	8.5	14.5	12.5	16.5	15.0	15.5	13.5	9.0	8.0
25	---	---	13.5	9.5	15.0	11.5	16.0	14.5	14.5	13.0	8.5	7.0
26	3.5	2.5	15.0	11.0	14.5	10.5	18.0	14.5	14.0	12.0	8.0	7.0
27	4.0	3.0	16.0	11.5	14.0	11.5	18.0	16.0	13.0	11.5	8.0	7.5
28	4.5	3.5	16.0	12.0	13.5	11.5	18.0	14.0	12.0	10.5	9.0	7.5
29	5.0	4.0	16.0	13.5	15.0	10.5	16.5	14.5	11.5	10.0	10.5	9.0
30	5.0	4.5	17.0	13.5	15.0	11.0	17.5	14.5	12.5	11.5	11.0	10.5
31	---	---	15.5	11.0	---	---	17.0	15.0	12.5	11.5	---	---
MONTH					15.5	8.0	18.5	11.5			15.5	7.0

04031000 BLACK RIVER NEAR BESSEMER, MI

LOCATION.--Lat 46°30'41", long 90°04'28", in NE¼ SE¼ sec.32, T.48 N., R.46 W., Gogebic County, Hydrologic Unit 04020101, on right bank 450 ft (137 m) downstream from bridge on county highway, 500 ft (152 m) downstream from Powder Mill Creek, and 2.5 mi (4.0 km) northwest of Bessemer.

DRAINAGE AREA.--200 mi² (518 km²).

PERIOD OF RECORD.--October 1954 to September 1982 (discontinued).

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,154.3 ft (351.83 m) National Geodetic Vertical Datum of 1929 (levels by registered surveyor).

REMARKS.--Records good except those for the winter period, which are fair. Prior to 1967, flow included some ground water pumped from mines at Bessemer. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--28 years, 237 ft³/s (6.712 m³/s), 16.09 in/yr (409 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,800 ft³/s (419 m³/s) Apr. 24, 1960, gage height, 14.27 ft (4.349 m), from flood-mark, from rating curve extended above 5,300 ft³/s (150 m³/s) on basis of slope-area measurement of peak flow; minimum daily, 6.8 ft³/s (0.19 m³/s) Sept. 25, Oct. 1-3, 1976; minimum gage height, 0.36 ft (0.110 m) Sept. 9, 1970.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,500 ft³/s (42.5 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Apr. 17	0700	3900	110	8.39	2.557	May 6	2300	1540	43.6	4.96	1.512
Apr. 24	2300	*3960	112	*8.46	2.579	July 13	2300	1720	48.7	5.28	1.609

Minimum discharge, 28 ft³/s (0.79 m³/s) Aug. 21, gage height, 0.68 ft (0.207 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	136	217	67	58	58	58	500	570	277	35	97	77
2	167	179	72	59	58	56	650	475	233	33	83	88
3	116	163	73	59	59	54	700	403	192	52	75	79
4	136	146	72	60	60	53	800	347	158	61	64	63
5	175	138	71	60	59	52	750	793	131	162	57	114
6	227	124	72	60	58	51	700	1140	109	185	54	182
7	250	113	73	59	56	50	680	1330	94	216	51	140
8	215	106	70	59	55	50	640	968	76	204	51	110
9	191	92	65	58	55	50	620	739	67	345	51	90
10	176	89	56	58	53	50	602	726	70	512	47	79
11	160	82	60	58	52	50	554	638	59	759	43	79
12	144	78	66	58	51	52	646	531	54	665	40	92
13	133	77	75	58	51	53	978	567	49	670	39	223
14	124	77	70	58	50	55	1180	558	43	962	38	345
15	119	73	65	58	51	58	2200	465	48	660	36	348
16	116	68	60	58	52	60	3040	397	48	1010	36	387
17	144	66	55	58	52	62	3650	406	44	1070	34	366
18	411	62	55	57	53	62	2910	486	42	891	32	450
19	420	62	57	57	54	62	3390	456	40	637	32	366
20	469	66	58	57	55	61	2680	389	45	450	31	372
21	493	68	60	56	56	60	2030	324	47	332	28	366
22	400	66	60	56	60	62	1970	267	44	251	53	286
23	350	65	62	56	65	64	2450	222	41	189	45	236
24	295	67	64	56	67	66	3530	187	40	151	40	372
25	256	64	65	56	67	68	3670	163	40	126	38	381
26	224	67	65	57	66	65	2690	141	38	106	40	292
27	228	71	63	57	63	62	1840	123	37	95	48	231
28	243	67	61	57	60	66	1270	107	36	80	42	189
29	257	68	60	57	---	90	955	92	40	77	40	189
30	259	65	60	57	---	200	719	83	37	128	44	324
31	255	---	58	57	---	400	---	203	---	119	48	---
TOTAL	7289	2746	1990	1789	1596	2302	48994	14296	2279	11233	1457	6916
MEAN	235	91.5	64.2	57.7	57.0	74.3	1633	461	76.0	362	47.0	231
MAX	493	217	75	60	67	400	3670	1330	277	1070	97	450
MIN	116	62	55	56	50	50	500	83	36	33	28	63
CFSM	1.18	.46	.32	.29	.29	.37	8.17	2.31	.38	1.81	.24	1.16
IN.	1.36	.51	.37	.33	.30	.43	9.11	2.66	.42	2.09	.27	1.29

CAL YR 1981 TOTAL 89168 MEAN 244 MAX 3000 MIN 21 CFSM 1.22 IN 16.59
WTR YR 1982 TOTAL 102887 MEAN 282 MAX 3670 MIN 28 CFSM 1.41 IN 19.14

STREAMS TRIBUTARY TO LAKE SUPERIOR

04031500 PRESQUE ISLE RIVER AT MARENISCO, MI

LOCATION.--Lat 46°22'20", long 89°41'32", in SE¼ NW¼ sec.21, T.46 N., R.43 W., Gogebic County, Hydrologic Unit 04020101, on left bank 0.3 mi (0.5 km) upstream from highway bridge in Marenisco, and 1.5 mi (2.4 km) downstream from confluence of East and West Branches.

DRAINAGE AREA.--171 mi² (443 km²).

PERIOD OF RECORD.--February 1945 to September 1982 (discontinued).

REVISED RECORDS.--WSP 1707: 1954. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,489.30 ft (453.939 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to May 27, 1949, nonrecording gage at site 0.3 mi (0.5 km) downstream at different datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Feb. 1 to Mar. 4, which are fair. Occasional regulation for lake or pond level control at several locations in the headwaters. Since 1959, occasional regulation by Presque Isle Flooding Reservoir, usable capacity, about 3,000 acre-ft (3.7 hm³), 2.5 mi (4.0 km) upstream. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--37 years, 177 ft³/s (5.013 m³/s), 14.06 in/yr (357 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,520 ft³/s (99.7 m³/s) Apr. 25, 1960, gage height, 11.25 ft (3.429 m); minimum observed, 13 ft³/s (0.37 m³/s) Sept. 30, 1948, gage height, 2.25 ft (0.686 m), site and datum then in use.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 1,650 ft³/s (46.7 m³/s) Apr. 18; maximum gage height, 9.04 ft (2.755 m) Apr. 18, backwater from ice and log jam; minimum discharge, 36 ft³/s (1.02 m³/s) Aug. 21, gage height, 3.32 ft (1.012 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	71	142	82	82	84	80	240	681	263	62	117	59
2	77	129	84	82	85	80	270	617	228	56	112	59
3	77	122	83	82	85	78	300	468	198	66	109	58
4	78	113	82	82	84	75	400	415	172	98	100	54
5	80	110	87	82	83	75	550	447	151	154	95	73
6	81	107	89	82	82	72	550	587	134	209	90	136
7	81	104	93	82	80	72	550	743	131	203	86	139
8	81	98	94	83	80	70	540	768	110	184	86	131
9	81	95	90	83	78	70	500	693	101	182	70	107
10	82	94	75	84	75	70	480	644	105	258	64	88
11	82	85	80	84	73	70	450	591	94	443	64	86
12	78	87	85	84	72	72	420	537	88	497	62	79
13	77	84	94	84	70	75	480	519	83	428	60	80
14	87	83	88	84	70	78	530	526	83	394	58	87
15	91	80	82	84	72	80	520	492	94	367	55	97
16	91	79	75	83	72	82	650	454	94	398	52	119
17	91	80	70	82	73	82	1000	434	84	455	48	122
18	91	76	70	80	74	82	1650	453	79	480	45	143
19	123	74	73	80	74	81	1600	419	76	420	43	141
20	221	78	75	78	78	80	1500	374	79	342	38	152
21	208	78	77	79	80	80	1400	349	80	266	37	161
22	196	77	80	80	82	82	1310	315	79	220	62	171
23	186	68	82	80	83	85	1240	279	80	200	66	139
24	172	74	84	81	82	90	1330	253	84	177	60	121
25	160	76	85	82	82	92	1470	235	82	158	55	120
26	150	79	85	82	82	88	1420	217	80	145	52	115
27	152	82	85	82	82	88	1220	169	73	136	57	104
28	157	80	85	81	81	90	1050	145	65	133	50	96
29	160	78	85	80	---	110	886	157	71	135	54	114
30	160	80	84	80	---	140	770	166	69	139	64	130
31	158	---	83	82	---	170	---	198	---	130	59	---
TOTAL	3680	2692	2566	2536	2198	2639	25276	13345	3210	7535	2070	3281
MEAN	119	89.7	82.8	81.8	78.5	85.1	843	430	107	243	66.8	109
MAX	221	142	94	84	85	170	1650	768	263	497	117	171
MIN	71	68	70	78	70	70	240	145	65	56	37	54
CFSM	.70	.53	.48	.48	.46	.50	4.93	2.52	.63	1.42	.39	.64
IN.	.80	.59	.56	.55	.48	.57	5.50	2.90	.70	1.64	.45	.71

CAL YR 1981 TOTAL 61308 MEAN 168 MAX 945 MIN 26 CFSM .98 IN 13.34
WTR YR 1982 TOTAL 71028 MEAN 195 MAX 1650 MIN 37 CFSM 1.14 IN 15.45

04033000 MIDDLE BRANCH ONTONAGON RIVER NEAR PAULDING, MI

LOCATION.--Lat 46°21'25", long 89°04'38", in SE¼ NE¼ sec.29, T.46 N., R.38 W., Ontonagon County, Hydrologic Unit 04020102, Ottawa National Forest, on right bank 25 ft (8 m) downstream from bridge on Forest Service Road 172, 2.4 mi (3.9 km) upstream from Bond Falls Reservoir, and 5.7 mi (9.2 km) southeast of Paulding.

DRAINAGE AREA.--164 mi² (425 km²).

PERIOD OF RECORD.--June 1942 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,485.66 ft (452.829 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Sept. 28, 1942, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--40 years, 173 ft³/s (4.899 m³/s), 14.33 in/yr (364 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,050 ft³/s (58.1 m³/s) Apr. 30, 1951, gage height, 10.0 ft (3.05 m), from high-water mark; minimum, 27 ft³/s (0.76 m³/s) Nov. 22, 1946, result of freezeup; minimum gage height, 2.96 ft (0.902 m) Nov. 26, 1942, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,090 ft³/s (30.9 m³/s) Apr. 26, gage height, 8.18 ft (2.493 m); minimum daily, 85 ft³/s (2.41 m³/s) Feb. 14, 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	169	135	118	110	105	100	198	482	182	123	163	128
2	196	130	122	110	105	100	180	418	167	117	155	128
3	165	127	122	110	105	100	212	364	154	123	149	123
4	150	126	120	110	105	95	269	328	146	141	141	117
5	155	127	119	105	100	95	300	331	141	142	135	134
6	182	129	119	105	100	90	245	439	134	170	130	227
7	198	126	120	105	100	90	208	616	131	153	126	217
8	169	124	120	105	100	90	193	647	129	144	123	183
9	150	121	115	105	98	90	181	558	127	142	124	163
10	140	120	105	105	90	90	172	483	134	199	120	155
11	137	119	100	105	90	95	167	445	130	455	115	177
12	135	118	110	105	86	95	174	403	124	513	110	173
13	139	119	120	105	86	95	232	379	122	445	108	187
14	159	120	130	105	85	100	261	374	122	351	108	208
15	183	119	115	105	85	100	309	334	135	289	106	202
16	174	118	100	105	86	105	421	300	133	468	103	204
17	164	118	95	105	88	105	676	279	127	601	102	196
18	200	117	95	105	88	105	749	275	123	559	100	196
19	218	117	100	105	90	105	792	265	124	455	100	184
20	210	119	105	105	95	105	773	252	128	356	98	197
21	197	120	105	105	100	100	682	230	130	303	96	202
22	184	121	105	105	105	100	629	214	127	348	115	183
23	179	110	105	105	115	105	613	199	122	307	128	169
24	169	110	105	105	120	110	768	183	120	258	121	198
25	162	122	110	105	120	115	1020	173	123	231	114	222
26	155	120	110	105	115	110	1070	165	123	212	113	204
27	151	123	110	105	110	105	958	158	119	201	122	188
28	146	121	110	105	105	105	794	153	116	190	122	177
29	143	118	110	105	---	105	662	153	134	176	127	173
30	142	117	110	105	---	120	562	167	134	181	144	196
31	140	---	110	105	---	177	---	163	---	173	136	---
TOTAL	5161	3631	3440	3275	2777	3202	14470	9930	3961	8526	3754	5411
MEAN	166	121	111	106	99.2	103	482	320	132	275	121	180
MAX	218	135	130	110	120	177	1070	647	182	601	163	227
MIN	135	110	95	105	85	90	167	153	116	117	96	117
CFSM	1.01	.74	.68	.65	.61	.63	2.94	1.95	.81	1.68	.74	1.10
IN.	1.17	.82	.78	.74	.63	.73	3.28	2.25	.90	1.93	.85	1.23

CAL YR 1981 TOTAL 66314 MEAN 182 MAX 703 MIN 95 CFSM 1.11 IN 15.04
WTR YR 1982 TOTAL 67538 MEAN 185 MAX 1070 MIN 85 CFSM 1.13 IN 15.32

04033500 BOND FALLS CANAL NEAR PAULDING, MI

LOCATION.--Lat 46°23'57", long 89°08'47", in SW¼ NE¼ sec.11, T.46 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 40 ft (12 m) upstream from intake to pipeline No. 2, 0.8 mi (1.3 km) downstream from Bond Falls Reservoir on Middle Branch Ontonagon River, and 1.6 mi (2.6 km) east of Paulding.

PERIOD OF RECORD.--July 1942 to current year.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,441.59 ft (439.397 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1968, nonrecording gage at datum 3.00 ft (0.914 m) higher.

REMARKS.--Records good except those below 10 ft³/s (0.28 m³/s), which are poor. Canal diverts water from Bond Falls Reservoir (station 04034000) to South Branch Ontonagon River; water is used for power production at Victoria Dam near Rockland. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--40 years, 140 ft³/s (3.965 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 368 ft³/s (10.4 m³/s) May 5, 1960; no flow at times each year since 1961; minimum gage height observed, -0.03 ft (-0.009 m) Apr. 17, 1963, present datum (two drain holes in weir open and canal gate closed).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	157	12	135	130	170	258	.40	1.9	293	237	293	9.2
2	65	46	135	129	170	263	.20	2.2	205	237	293	19
3	14	95	135	129	170	258	1.2	2.6	133	236	291	33
4	14	156	135	129	194	255	.60	3.0	140	235	291	33
5	60	208	135	127	218	254	.40	3.2	146	235	294	34
6	102	208	134	127	218	250	.20	4.4	146	234	298	33
7	102	207	134	127	217	245	.10	4.2	205	233	297	33
8	102	207	134	127	214	244	.10	4.1	253	233	296	34
9	53	265	133	127	210	240	.10	4.3	253	232	297	34
10	13	311	133	126	209	236	.10	4.8	252	160	301	34
11	13	302	133	126	210	233	.10	96	251	57	300	34
12	84	300	133	126	212	231	.50	230	251	7.8	299	34
13	156	298	133	125	210	227	1.2	303	250	7.7	297	23
14	156	296	133	125	210	224	1.2	304	250	7.4	299	3.9
15	156	294	133	160	210	221	2.0	304	249	7.5	301	2.9
16	154	293	133	180	244	217	.98	302	248	8.3	299	4.4
17	154	290	132	180	268	214	.00	304	248	8.1	299	3.8
18	154	288	131	170	267	214	.03	302	247	7.7	297	3.0
19	86	287	130	170	267	208	.94	302	246	8.0	300	2.5
20	12	285	128	170	263	206	1.0	301	246	54	302	2.5
21	12	283	129	170	260	203	.75	300	245	106	300	2.6
22	12	281	129	170	255	200	.91	297	245	107	300	3.1
23	12	279	131	170	251	92	1.3	299	244	153	297	3.4
24	12	278	131	170	250	4.3	1.4	299	243	210	297	3.6
25	12	208	131	169	246	2.5	1.2	299	241	211	297	3.6
26	12	137	129	170	250	2.2	1.1	298	241	261	299	3.6
27	12	136	129	171	255	1.8	1.1	297	241	339	227	1.8
28	12	136	127	170	253	1.7	1.3	296	240	331	145	.00
29	12	136	128	170	---	1.9	1.4	296	239	312	136	.00
30	12	135	131	170	---	2.6	1.7	295	238	296	132	.00
31	12	---	131	170	---	1.3	---	294	---	294	79	---
TOTAL	1939	6657	4088	4680	6371	5211.3	23.51	6052.7	6929	5065.5	8453	431.90
MEAN	62.5	222	132	151	228	168	.78	195	231	163	273	14.4
MAX	157	311	135	180	268	263	2.0	304	293	339	302	34
MIN	12	12	127	125	170	1.3	.00	1.9	133	7.4	79	.00

CAL YR 1981 TOTAL 64246.92 MEAN 176 MAX 323 MIN .02
WTR YR 1982 TOTAL 55901.91 MEAN 153 MAX 339 MIN .00

04034000 BOND FALLS RESERVOIR NEAR PAULDING, MI

LOCATION.--Lat 46°24'29", long 89°07'42", in SW¼ sec.1, T.46 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, at Bond Falls Dam on Middle Branch Ontonagon River, 2.5 mi (4.0 km) east of Paulding.

DRAINAGE AREA.--190 mi² (492 km²).

PERIOD OF RECORD.--June 1942 to current year. Prior to October 1950, monthend contents only published in WSP 1307.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Nonrecording gage read once daily. Datum of gage is 1,335.59 ft (407.088 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Reservoir is formed by earthfill and concrete dam with one taintor gate; dam completed 1937. Usable capacity, 41,300 acre-ft (50.9 hm³) between gage heights of 120 ft (36.6 m) (maximum drawdown) and 141 ft (43.0 m) (full pond). Dead storage unknown. Water diverted to South Branch Ontonagon River through Bond Falls Canal (station 04033500); water used for power production at Victoria Dam near Rockland.

COOPERATION.--Gage-height record furnished by Upper Peninsula Power Co. and converted to acre-feet by Geological Survey.

EXTREMES FOR PERIOD OF RECORD (SINCE 1947).--Maximum contents observed, 42,980 acre-ft (53.0 hm³) July 3, 1953, gage height, 141.7 ft (43.19 m), of which 1,680 acre-ft (2.07 hm³) was uncontrolled storage; no usable storage at times; minimum gage height observed, 116.0 ft (35.36 m) Mar. 21, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 40,340 acre-ft (49.7 hm³) May 13-15, gage height, 140.6 ft (42.85 m); no usable storage Mar. 5 to Apr. 5; minimum gage height, 116.6 ft (35.54 m) Mar. 23.

MONTHEND GAGE HEIGHT AND CONTENTS AT 0930, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)	Change in contents (equivalent in ft³/s)
Sept. 30	129.1	15890	--	--
Oct. 31	132.2	21900	+6010	+97.7
Nov. 30	128.6	14940	-6960	-117
Dec. 31	127.4	12660	-2280	-37.1
CAL YR 1981	--	--	-7640	-10.6
Jan. 31	125.5	9100	-3560	-57.9
Feb. 28	121.0	1500	-7600	-137
Mar. 31	118.2	0	-1500	-24.4
Apr. 30	135.4	28480	+28480	+479
May 31	138.6	35680	+7200	+117
June 30	134.2	25920	-9760	-164
July 31	136.8	31560	+5640	+91.7
Aug. 31	131.2	19900	-11660	-190
Sept. 30	136.2	30240	+10340	+174
WTR YR 1982	--	--	+14350	+19.8

STREAMS TRIBUTARY TO LAKE SUPERIOR

04034500 MIDDLE BRANCH ONTONAGON RIVER NEAR TROUT CREEK, MI

LOCATION.--Lat 46°28'40", long 89°05'25", in SW¼ sec.8, T.47 N., R.38 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 0.1 mi (0.2 km) upstream from State Highway 28, 3.8 mi (6.1 km) west of village of Trout Creek, and 7.5 mi (12.1 km) downstream from Bond Falls Reservoir.

DRAINAGE AREA.--203 mi² (526 km²).

PERIOD OF RECORD.--June 1942 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,132.03 ft (345.043 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Nov. 4, 1942, nonrecording gage at same site and datum.

REMARKS.--Records good. Flow regulated by Bond Falls Reservoir (station 04034000) 7.5 mi (12.1 km) upstream. Diversion to South Branch Ontonagon River 8.5 mi (13.7 km) upstream by Bond Falls Canal (station 04033500). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--40 years, 67.2 ft³/s (1.903 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,750 ft³/s (49.6 m³/s) Nov. 7, 1951, gage height, 5.05 ft (1.539 m); minimum, 14 ft³/s (0.40 m³/s) sometime during period Jan. 23 to Feb. 13, 1947, gage height, 1.14 ft (0.347 m), from recorded range in stage, caused by ice jams upstream.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 272 ft³/s (7.70 m³/s) Apr. 16, gage height, 2.60 ft (0.792 m); minimum, 33 ft³/s (0.93 m³/s) Mar. 27, gage height, 1.50 ft (0.457 m), result of freezeup; minimum daily, 43 ft³/s (1.22 m³/s) Feb. 24, 25, Mar. 2, 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	69	50	47	45	44	44	58	54	54	57	57	57
2	58	50	48	46	44	43	55	54	60	57	57	51
3	53	50	48	47	44	43	70	52	59	58	57	50
4	54	50	48	46	44	44	61	50	59	57	56	50
5	54	50	48	46	44	44	55	51	58	56	55	57
6	62	50	47	46	44	44	52	77	58	55	55	54
7	56	50	48	46	44	44	51	93	60	56	56	50
8	53	49	47	46	44	44	50	62	58	55	55	50
9	51	48	45	46	44	45	50	55	59	60	56	50
10	51	48	46	46	44	47	50	65	59	66	56	51
11	51	48	46	46	44	45	50	57	58	82	56	50
12	50	48	46	46	44	44	59	52	59	64	55	50
13	51	48	46	46	44	45	69	58	58	66	56	55
14	53	48	46	46	44	44	70	98	60	66	56	53
15	52	48	45	46	45	44	89	151	60	62	56	54
16	51	48	44	46	44	45	156	144	59	81	56	53
17	53	47	46	46	44	45	152	143	59	77	55	53
18	62	46	46	46	44	45	91	134	58	66	56	51
19	57	46	46	46	44	44	90	107	58	61	57	53
20	56	48	46	45	44	44	70	64	61	59	57	54
21	55	46	46	46	45	44	64	48	60	57	57	52
22	53	46	46	45	44	44	66	48	59	57	70	51
23	53	46	46	45	44	44	89	48	58	57	60	52
24	51	46	45	45	43	45	114	47	58	57	58	54
25	52	46	46	45	43	45	93	46	58	57	58	53
26	52	47	46	45	44	45	70	46	58	57	61	51
27	53	47	45	44	44	45	61	46	58	57	62	51
28	52	46	45	44	44	46	57	46	58	57	59	51
29	51	47	44	44	---	46	56	48	59	57	70	54
30	51	46	45	44	---	53	55	47	57	57	63	52
31	51	---	45	44	---	64	---	53	---	57	61	---
TOTAL	1671	1433	1428	1410	1232	1408	2173	2144	1757	1888	1799	1567
MEAN	53.9	47.8	46.1	45.5	44.0	45.4	72.4	69.2	58.6	60.9	58.0	52.2
MAX	69	50	48	47	45	64	156	151	61	82	70	57
MIN	50	46	44	44	43	43	50	46	54	55	55	50

CAL YR 1981 TOTAL 19902 MEAN 54.5 MAX 177 MIN 44
WTR YR 1982 TOTAL 19910 MEAN 54.5 MAX 156 MIN 43

04035500 MIDDLE BRANCH ONTONAGON RIVER NEAR ROCKLAND, MI

LOCATION.--Lat 46°41'57", long 89°09'36", in SE¼ sec.27, T.50 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 10 ft (3 m) upstream from bridge on U.S. Highway 45, 700 ft (213 m) downstream from East Branch, and 2.8 mi (4.5 km) southeast of Rockland.

DRAINAGE AREA.--671 mi² (1,738 km²).

PERIOD OF RECORD.--July 1942 to current year.

GAGE.--Water-stage recorder. Datum of gage is 661.1 ft (201.50 m) National Geodetic Vertical Datum of 1929. Prior to Apr. 1, 1959, nonrecording gage at site 400 ft (122 m) upstream at same datum. Apr. 1, 1959 to Oct. 21, 1968, nonrecording gage at present site and datum.

REMARKS.--Records fair. Regulation by Bond Falls Reservoir (station 04034000) 30.0 mi (48.3 km) upstream. Diversion to South Branch Ontonagon River by Bond Falls Canal (station 04033500) 31.0 mi (49.9 km) upstream. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--40 years, 529 ft³/s (14.98 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 27,000 ft³/s (765 m³/s) Aug. 22, 1942, gage height, 21.2 ft (6.46 m), from flood-marks, from rating curve extended above 7,500 ft³/s (212 m³/s) on basis of slope-area measurement of peak flow; minimum observed, 142 ft³/s (4.02 m³/s) Dec. 3, 1963, discharge measurement; minimum daily, 145 ft³/s (4.11 m³/s) Dec. 3, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 9,610 ft³/s (272 m³/s) Apr. 17, gage height, 11.94 ft (3.639 m); maximum gage height, 12.15 ft (3.703 m) Apr. 16, backwater from debris; minimum discharge, 202 ft³/s (5.72 m³/s) Nov. 23; minimum daily, 220 ft³/s (6.23 m³/s) Aug. 21.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	710	412	284	270	275	275	1200	762	726	230	286	330
2	810	365	295	270	280	265	2120	663	478	230	264	351
3	600	350	293	280	280	255	2550	574	363	230	260	331
4	465	328	292	280	275	250	2130	509	315	230	260	283
5	465	319	286	280	275	250	1520	577	288	233	254	276
6	597	316	283	280	275	250	1180	2130	274	235	240	506
7	750	316	292	280	270	245	920	2910	261	235	250	440
8	585	308	289	280	265	240	764	1480	260	231	284	334
9	465	298	271	280	260	240	707	950	260	265	259	293
10	412	288	240	280	250	245	757	1400	264	525	251	270
11	372	286	276	280	240	250	677	1290	265	1570	239	260
12	356	283	280	280	230	250	860	850	262	1250	231	285
13	328	283	310	280	230	260	2510	970	260	751	227	297
14	474	277	300	285	230	265	2790	1160	257	697	226	324
15	578	274	275	290	230	270	4110	890	271	527	226	333
16	501	274	265	290	235	275	5620	719	267	641	227	389
17	447	274	240	290	235	280	7350	677	261	1030	231	395
18	1030	272	250	285	240	280	3040	725	256	736	230	383
19	1090	268	260	280	250	280	2750	669	248	467	226	360
20	1220	271	270	280	260	270	2030	508	247	343	222	395
21	1140	265	275	280	270	270	1290	428	250	296	220	450
22	760	255	280	275	285	280	1710	380	250	286	427	374
23	660	231	290	275	300	290	3220	347	250	286	443	321
24	598	306	295	275	310	300	4530	326	246	279	356	313
25	560	315	300	270	310	315	3810	317	245	265	309	381
26	539	287	290	270	305	300	2460	312	242	257	297	375
27	574	307	290	270	300	290	1680	300	236	249	297	327
28	663	310	280	265	285	280	1300	290	231	241	301	292
29	644	289	280	265	---	320	1060	287	230	233	297	278
30	543	285	275	270	---	500	890	297	230	377	372	340
31	471	---	270	270	---	900	---	467	---	342	348	---
TOTAL	19407	8912	8676	8605	7450	9240	67535	24164	8493	13767	8560	10286
MEAN	626	297	280	278	266	298	2251	779	283	444	276	343
MAX	1220	412	310	290	310	900	7350	2910	726	1570	443	506
MIN	328	231	240	265	230	240	677	287	230	230	220	260

CAL YR 1981 TOTAL 211531 MEAN 580 MAX 5680 MIN 228
WTR YR 1982 TOTAL 195095 MEAN 535 MAX 7350 MIN 220

04036000 WEST BRANCH ONTONAGON RIVER NEAR BERGLAND, MI

LOCATION.--Lat 46°35'15", long 89°32'30", in SW¼ NE¼ sec.3, T.48 N., R.42 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 0.4 mi (0.6 km) downstream from dam at outlet of Gogebic Lake, and 1.5 mi (2.4 km) east of Bergland.

DRAINAGE AREA.--162 mi² (420 km²).

PERIOD OF RECORD.--July 1942 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,290.81 ft (393.439 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 5, 1942, nonrecording gage 0.4 mi (0.6 km) upstream at different datum.

REMARKS.--Records good except those below 25 ft³/s (0.71 m³/s), which are poor. Flow regulated by Gogebic Lake, usable capacity, 35,200 acre-ft (43.4 hm³). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--40 years, 175 ft³/s (4.956 m³/s), 14.67 in/yr (373 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,400 ft³/s (39.6 m³/s) Apr. 26, 1960, gage height, 5.98 ft (1.823 m); minimum daily, 0.70 ft³/s (0.020 m³/s) Sept. 26 to Oct. 19, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 980 ft³/s (27.8 m³/s) Apr. 26, 27, gage height, 5.00 ft (1.524 m); minimum daily, 2.4 ft³/s (0.07 m³/s) Oct. 3-6.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.5	184	55	107	163	135	95	866	278	7.0	8.8	7.0
2	2.5	186	58	105	158	130	116	849	307	6.7	8.8	7.0
3	2.4	188	61	107	217	133	132	819	296	7.0	9.4	7.0
4	2.4	182	60	103	216	125	133	663	279	7.0	9.4	7.0
5	2.4	179	60	101	215	123	160	510	259	12	9.4	7.0
6	2.4	157	62	104	215	125	168	551	251	13	9.7	7.0
7	2.5	164	56	97	215	120	174	609	250	15	9.7	7.0
8	2.5	145	57	96	215	119	179	657	188	15	9.4	7.0
9	2.5	144	58	97	215	115	183	685	192	15	8.8	7.0
10	56	149	118	109	215	111	188	718	188	98	8.8	7.0
11	87	103	173	115	215	113	190	710	169	431	8.8	7.0
12	124	91	168	109	215	112	197	681	155	511	8.8	7.0
13	155	88	162	104	215	119	216	678	143	474	8.8	6.7
14	151	77	159	101	215	119	231	670	140	473	8.8	6.4
15	148	72	152	123	215	109	263	471	100	465	8.8	6.4
16	152	67	147	150	212	107	322	308	87	490	8.8	6.4
17	150	68	147	137	196	106	440	302	79	480	9.4	6.4
18	142	60	145	141	162	107	543	344	75	447	9.4	6.4
19	188	55	142	150	161	103	641	299	76	411	9.4	6.4
20	184	55	137	170	156	104	702	222	71	381	9.4	6.4
21	191	60	135	187	153	105	735	33	64	292	8.8	6.4
22	213	60	131	180	149	104	758	26	40	237	8.8	5.4
23	186	60	127	191	146	104	789	12	29	207	8.8	4.8
24	208	60	127	189	143	105	850	12	30	195	8.8	4.8
25	198	60	117	190	146	104	884	13	26	183	8.8	4.8
26	182	61	112	172	139	103	964	14	13	99	8.8	4.8
27	164	64	112	198	136	103	972	60	7.0	33	7.6	83
28	257	59	110	190	134	102	960	115	5.8	8.2	7.0	112
29	324	62	108	195	---	100	940	136	7.0	8.8	7.0	142
30	277	57	105	198	---	100	909	133	7.0	9.4	7.0	185
31	222	---	106	181	---	108	---	165	---	8.8	7.0	---
TOTAL	3981.1	3017	3467	4397	5152	3473	14034	12331	3811.8	6039.9	271.0	688.5
MEAN	128	101	112	142	184	112	468	398	127	195	8.74	23.0
MAX	324	188	173	198	217	135	972	866	307	511	9.7	185
MIN	2.4	55	55	96	134	100	95	12	5.8	6.7	7.0	4.8

CAL YR 1981 TOTAL 57211.8 MEAN 157 MAX 896 MIN 2.2 CFSM .97 IN 13.14
WTR YR 1982 TOTAL 60663.3 MEAN 166 MAX 972 MIN 2.4 CFSM 1.02 IN 13.93

04037500 CISCO BRANCH ONTONAGON RIVER AT CISCO LAKE OUTLET, MI

LOCATION.--Lat 46°15'12", long 89°27'05", in NE¼ sec.32, T.45 N., R.41 W., Gogebic County, Hydrologic Unit 04020102, on left bank 80 ft (24 m) downstream from Cisco Lake Dam, 2.5 mi (4.0 km) upstream from Langford Creek, 5.0 mi (8.0 km) upstream from U.S. Highway 2, and 13 mi (21 km) west of Watersmeet.

DRAINAGE AREA.--50.7 mi² (131.3 km²).

PERIOD OF RECORD.--October 1944 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,672.69 ft (509.836 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1968, nonrecording gage at same site and at datum 4.00 ft (1.219 m) higher.

REMARKS.--Records good except those for period of no gage-height record, May 17 to June 16, which are fair and those below 10.0 ft³/s (0.28 m³/s), which are poor. Flow completely regulated by Cisco Lake, usable capacity, 15,600 acre-ft (19.2 hm³). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--38 years, 47.1 ft³/s (1.334 m³/s), 12.62 in/yr (321 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 288 ft³/s (8.16 m³/s) May 1-4, 1951, gage height, 6.10 ft (1.859 m), present datum; minimum daily, 0.09 ft³/s (0.003 m³/s) June 4-23, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge recorded, 206 ft³/s (5.83 m³/s) July 17, gage height, 5.66 ft (1.725 m), but may have been more during period of no gage-height record May 17 to June 16; minimum daily, 0.29 ft³/s (0.008 m³/s) Aug. 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	139	92	31	34	32	29	78	116	77	52	1.3	91
2	173	90	32	45	32	29	78	113	72	51	1.2	60
3	142	87	32	52	32	29	84	91	70	52	1.2	51
4	117	85	32	52	32	29	86	33	65	52	1.2	40
5	113	82	32	52	31	29	86	3.0	29	119	1.2	33
6	76	63	32	51	31	28	85	4.9	27	176	1.2	37
7	44	52	32	51	31	28	84	29	29	97	1.2	88
8	67	49	32	51	31	28	83	74	14	30	.77	126
9	88	39	32	51	31	29	81	82	3.1	32	.55	97
10	85	30	33	51	30	29	81	83	2.0	92	.56	83
11	83	30	33	51	30	28	80	131	1.9	163	.62	94
12	94	31	33	51	30	29	81	135	1.0	181	.55	92
13	101	31	33	51	30	30	84	136	1.0	177	.42	94
14	100	31	33	51	30	29	84	113	1.3	150	.33	91
15	97	31	33	51	30	29	86	94	1.3	134	.32	90
16	96	30	32	51	30	29	98	113	.40	178	.31	77
17	108	30	32	50	30	29	111	164	.43	201	.31	69
18	109	30	33	50	30	29	119	128	.46	198	.30	69
19	125	30	33	36	30	29	124	124	.63	195	.31	70
20	131	30	33	29	30	30	131	144	.70	194	.30	69
21	127	31	34	29	29	30	132	126	.70	188	.31	69
22	123	31	33	30	30	30	133	101	.70	184	.33	70
23	117	31	33	32	30	30	136	82	.70	162	.33	70
24	118	31	33	32	30	30	122	41	.94	148	.31	68
25	111	31	33	32	29	30	112	1.9	.97	142	.29	61
26	109	31	33	32	30	30	113	1.9	10	70	.82	51
27	104	31	34	32	29	30	115	1.9	17	9.6	11	50
28	103	31	33	32	29	30	106	1.9	17	3.8	26	51
29	102	31	33	32	---	30	104	2.0	37	3.3	35	51
30	100	31	33	32	---	30	117	2.0	53	2.9	58	51
31	95	---	34	32	---	62	---	39	---	2.1	103	---
TOTAL	3297	1283	1014	1308	849	940	3014	2311.5	535.23	3439.7	249.54	2113
MEAN	106	42.8	32.7	42.2	30.3	30.3	100	74.6	17.8	111	8.05	70.4
MAX	173	92	34	52	32	62	136	164	77	201	103	126
MIN	44	30	31	29	29	28	78	1.9	.40	2.1	.29	33

CAL YR 1981 TOTAL 17915.45 MEAN 49.1 MAX 213 MIN .25 CFSM .97 IN 13.15
WTR YR 1982 TOTAL 20353.97 MEAN 55.8 MAX 201 MIN .29 CFSM 1.10 IN 14.93

STREAMS TRIBUTARY TO LAKE SUPERIOR

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI
(National stream-quality accounting network station)

LOCATION.--Lat 46°43'15", long 89°12'25", in NE¼ sec.20, T.50 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 50 ft (15 m) downstream from bridge on Victoria Road, 1.8 mi (2.9 km) southwest of Rockland, and 2.4 mi (3.9 km) downstream from confluence of Middle and West Branches.

DRAINAGE AREA.--1,340 mi² (3,470 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1942 to current year.

REVISED RECORDS.--WSP 1387: 1943, 1946-47. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 638.72 ft (194.682 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 23, 1943, nonrecording gage and Nov. 23, 1943 to Oct. 17, 1967, water-stage recorder at site 50 ft (15 m) upstream at same datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Flow regulated by Victoria powerplant on West Branch 5 mi (8 km) upstream; Bond Falls Reservoir (station 04034000) 34 mi (55 km) upstream; Gogebic and Cisco Lakes, combined usable capacity, 50,800 acre-ft (62.6 hm³), in headwaters.

AVERAGE DISCHARGE.--40 years, 1,413 ft³/s (40.02 m³/s), 14.32 in/yr (364 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 42,000 ft³/s (1,190 m³/s) Aug. 22, 1942, gage height, 28.6 ft (8.73 m) from floodmark, from rating curve extended above 14,000 ft³/s (396 m³/s) on basis of slope-area measurement of peak flow; minimum daily, 192 ft³/s (5.44 m³/s) July 28, 29, 1963.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 9,000 ft³/s (255 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Apr. 1	0300	ice jam		*18.41	5.611
Apr. 17	0500	*18500	524	16.93	5.160
Apr. 24	2100	14600	413	15.15	4.618

Minimum daily discharge, 509 ft³/s (14.4 m³/s) June 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	957	1140	796	740	850	1000	4000	2950	2030	630	771	698
2	1200	897	667	700	760	1000	4700	2540	1660	687	792	628
3	1220	942	687	650	850	750	5300	2270	1390	568	684	728
4	810	907	690	750	760	940	4500	2210	1230	622	729	568
5	859	1040	711	800	800	900	3500	1980	1110	686	685	569
6	992	958	598	750	880	850	3000	5330	1020	729	713	771
7	1370	1040	751	730	800	820	2200	6980	893	753	702	721
8	1200	983	750	750	850	800	2000	5130	883	755	738	790
9	915	929	729	650	850	800	1600	3750	902	880	650	627
10	608	856	553	750	830	800	1600	3570	961	1030	720	652
11	686	969	693	550	800	800	1600	3850	932	4240	696	695
12	880	910	771	700	800	760	2220	2850	871	4830	652	589
13	704	906	880	700	720	800	4990	3330	800	3280	668	705
14	880	822	860	660	760	820	6430	3780	828	3050	652	522
15	1120	877	880	760	780	820	8490	3250	841	1880	641	855
16	1150	887	840	740	760	760	11900	2250	793	2110	606	662
17	1100	818	780	800	760	820	17500	2150	681	2650	698	944
18	1740	837	750	780	820	800	13300	2270	781	2540	619	827
19	2560	817	780	800	880	760	10300	2170	698	1690	651	809
20	2370	842	800	800	820	750	8000	1930	685	1280	599	821
21	2720	819	860	850	820	750	5920	1530	720	1170	625	1040
22	2090	697	880	800	880	800	5770	1380	722	1220	954	975
23	1600	751	880	750	880	750	8570	1270	662	1110	800	1010
24	1420	801	880	860	900	880	12500	1040	633	1050	804	899
25	1350	896	850	760	860	700	11900	999	661	1060	720	833
26	1270	719	820	800	840	700	8970	1100	625	1080	719	1100
27	1280	821	860	800	900	700	5940	829	509	893	756	768
28	1430	771	860	850	880	700	4940	767	599	852	729	763
29	1440	675	830	800	---	800	3810	1020	616	858	631	746
30	1440	665	800	760	---	1100	3280	992	600	968	658	994
31	1300	---	800	800	---	3200	---	1170	---	757	739	---
TOTAL	40661	25992	24286	23390	23810	27630	188730	76637	26336	45988	21801	23389
MEAN	1312	866	783	755	822	891	6291	2472	878	1481	703	777
MAX	2720	1140	880	860	900	3200	17500	6980	2030	4830	954	1100
MIN	608	665	553	550	720	700	1600	767	509	568	599	522

CAL YR 1981 TOTAL 538992 MEAN 1477 MAX 10500 MIN 262 CFSM 1.10 IN 14.96
WTR YR 1982 TOTAL 547690 MEAN 1501 MAX 17500 MIN 509 CFSM 1.12 IN 15.20

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967, 1972 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to September 1981.
WATER TEMPERATURES: October 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor October 1975 to September 1977.

REMARKS.--Bimonthly samples were collected during the year as a cross-section sample at upstream side of bridge on Victoria Road. Complete ice cover during winter period. Daily record for water years 1975, 1978-81 is from once-daily observer samples.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded (water years 1975-80), 192 micromhos Mar. 26, 1977, May 28, 1978; minimum (water years 1975-76, 1979-80), 45 micromhos Dec. 2, 1975.
WATER TEMPERATURES: Maximum (water years 1975-80), 28.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV												
18...	1400	1170	120	7.3	4.5	12.6	100	K4	K12	58	4.0	16
JAN												
19...	1430	800	136	7.3	.0	12.4	87	K8	62	65	7.0	18
MAR												
01...	1445	1000	144	7.6	.0	13.6	95	K9	K720	69	6.0	19
MAY												
11...	1445	3690	76	7.7	13.0	10.2	99	80	320	42	6.0	12
JUN												
22...	1300	1050	111	7.8	18.0	9.3	99	K10	246	57	1.0	16
AUG												
09...	1500	1130	127	7.8	20.5	8.5	97	K22	K1300	64	2.0	18

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
NOV												
18...	4.4	2.1	7	1.0	54	4.3	2.2	<.1	7.8	92	72	.13
JAN												
19...	4.9	2.1	6	.9	58	7.1	2.4	<.1	9.5	104	80	.14
MAR												
01...	5.3	2.6	7	1.1	63	4.0	2.3	<.1	11	99	83	.13
MAY												
11...	2.8	1.9	9	.5	36	5.0	1.7	<.1	5.9	78	52	.11
JUN												
22...	4.2	2.7	9	.9	56	5.0	2.0	<.1	7.1	80	71	.11
AUG												
09...	4.7	2.5	8	.5	62	4.0	1.7	<.1	9.3	93	78	.13

STREAMS TRIBUTARY TO LAKE SUPERIOR

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982--CONTINUED

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, AM-MONIA + ONGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV												
18...	291	.03	<.010	.01	.21	<.010	--	<.010	<.010	11	35	100
JAN												
19...	225	.15	.030	.04	.39	.040	.12	.020	.010	--	--	--
MAR												
01...	267	.17	.030	.04	.22	.040	.12	.010	<.010	--	--	--
MAY												
11...	777	<.10	.010	.01	.63	.090	.28	.020	<.010	126	1260	79
JUN												
22...	227	<.10	.030	.04	.40	.040	.12	<.010	<.010	23	65	100
AUG												
09...	284	<.10	<.010	.01	.20	.050	.15	<.010	.020	36	110	95

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
NOV										
18...	1400	1	1	<100	23	--	2	30	20	<1
JAN										
19...	1430	1	0	<100	24	1	<1	10	<10	<1
MAY										
11...	1445	1	1	<100	24	<1	<1	20	10	2
JUN										
22...	1300	1	1	<100	29	1	<1	20	10	2

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
NOV										
18...	<1	45	2	410	120	2	<1	30	12	<.1
JAN										
19...	<1	7	4	460	130	4	<1	30	8	<.1
MAY										
11...	<1	13	9	2400	200	4	2	70	11	.8
JUN										
22...	<1	5	2	490	97	7	2	40	6	<.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
NOV									
18...	<.1	2	<1	<1	<1	<1	<1	40	<4
JAN									
19...	<.1	2	<1	<1	<1	<1	<1	40	8
MAY									
11...	.2	6	3	<1	<1	<1	<1	30	<3
JUN									
22...	<.1	3	<1	<1	<1	<1	<1	30	<4

04040500 STURGEON RIVER NEAR SIDNAW, MI

LOCATION.--Lat 46°35'03", long 88°34'33", in NE¼ SE¼ sec.5, T.48 N., R.34 W., Baraga County, Hydrologic Unit 04020104, on right bank 30 ft (9 m) downstream from highway bridge, 3.0 mi (4.8 km) downstream from Rock River, 3.5 mi (5.6 km) northwest of Covington, 6.5 mi (10.5 km) upstream from Perch River, 8.5 mi (13.7 km) northeast of Sidnaw, and at mile 71 (114 km).

DRAINAGE AREA.--171 mi² (443 km²).

PERIOD OF RECORD.--October 1912 to September 1915, April 1943 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1507: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,214.40 ft (370.149 m) National Geodetic Vertical datum of 1929. October 1912 to September 1915, nonrecording gage at site 200 ft (61 m) upstream at different datum. Apr. 2, 1943 to Oct. 1, 1946, nonrecording gage at present site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--42 years, 215 ft³/s (6.089 m³/s), 17.07 in/yr (434 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,630 ft³/s (131 m³/s) Apr. 24, 1960, gage height, 11.63 ft (3.545 m); minimum, 2.7 ft³/s (0.076 m³/s) Sept. 13, 1976, gage height, 3.17 ft (0.966 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,760 ft³/s (78.2 m³/s) Apr. 26, gage height, 8.90 ft (2.713 m); minimum, 13 ft³/s (0.37 m³/s) July 3, gage height, 3.55 ft (1.082 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	181	195	98	68	62	60	332	1710	103	16	185	153
2	332	178	94	68	62	60	285	1510	97	15	145	163
3	343	161	97	68	62	60	320	1350	89	13	465	180
4	297	149	97	68	62	60	370	1170	82	14	555	163
5	264	143	94	68	62	60	400	997	72	19	625	167
6	326	143	86	68	62	60	370	1040	64	22	410	258
7	396	139	97	68	62	60	350	1340	59	20	282	246
8	364	133	93	68	62	60	310	1280	53	18	220	202
9	389	126	90	68	60	60	294	983	49	16	208	169
10	246	121	88	68	60	60	279	896	61	39	182	153
11	210	110	87	68	60	60	258	848	66	544	153	694
12	185	107	87	68	60	62	255	750	65	854	122	800
13.	165	102	90	68	60	64	340	680	60	750	102	755
14	210	99	89	68	60	66	346	640	53	575	89	640
15	237	97	89	67	60	68	520	550	52	382	79	530
16	212	94	80	66	60	70	818	456	48	599	71	488
17	195	93	72	65	62	72	1050	392	45	615	62	432
18	308	92	74	64	64	74	866	357	42	488	55	420
19	406	92	78	62	65	74	806	329	40	371	48	392
20	385	107	80	62	66	74	750	300	39	258	44	484
21	388	100	77	62	66	74	705	279	37	192	40	520
22	346	94	74	62	66	74	675	249	35	165	174	468
23	309	90	72	62	64	74	878	212	33	133	282	392
24	270	94	70	62	64	75	1590	185	31	108	240	364
25	234	93	70	62	62	75	2290	165	30	93	185	371
26	212	93	70	62	62	76	2680	151	26	80	151	329
27	202	97	70	62	62	78	2520	133	22	72	149	288
28	205	97	69	62	60	82	2200	122	20	65	141	252
29	210	94	68	62	---	86	1990	112	19	58	139	231
30	218	92	68	62	---	107	1650	105	17	135	173	279
31	212	---	68	62	---	241	---	97	---	285	165	---
TOTAL	8369	3425	2528	2020	1739	2346	26687	19388	1509	6934	5941	10983
MEAN	270	114	81.5	65.2	62.1	75.7	890	625	50.3	224	192	366
MAX	406	195	97	68	66	241	2680	1710	103	854	625	800
MIN	165	90	68	62	60	60	255	97	17	13	40	153
CFSM	1.58	.67	.48	.38	.36	.44	5.21	3.66	.29	1.31	1.12	2.14
IN.	1.82	.75	.55	.44	.38	.51	5.81	4.22	.33	1.51	1.29	2.39

CAL YR 1981 TOTAL 84151 MEAN 231 MAX 1630 MIN 22 CFSM 1.35 IN 18.31
WTR YR 1982 TOTAL 91869 MEAN 252 MAX 2680 MIN 13 CFSM 1.47 IN 19.99

04041500 STURGEON RIVER NEAR ALSTON, MI

LOCATION.--Lat 46°43'35", long 88°39'43", in SW¼ sec.15, T.50 N., R.35 W., Baraga County, Hydrologic Unit 04020104, on right bank in powerhouse of Upper Peninsula Power Co. at Prickett Dam, 4.0 mi (6.4 km) upstream from Clear Creek, 5.0 mi (8.0 km) southeast of Alston, and at mile 45 (72 km).

DRAINAGE AREA.--346 mi² (896 km²).

PERIOD OF RECORD.--February 1932 to June 1941, October 1942 to current year. Monthly discharge only for some periods, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 710.3 ft (216.50 m) mean tide at New York City datum (levels by Corps of Engineers). Prior to Jan. 5, 1948, nonrecording gage, and Jan. 5, 1948 to Sept. 30, 1963, water-stage recorder at same site at datum 40.00 ft (12.192 m) lower.

REMARKS.--Records good. Flow regulated by powerplant at station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--48 years, (water years 1933-40, 1943-82), 421 ft³/s (11.92 m³/s), 16.52 in/yr (420 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,360 ft³/s (208 m³/s) Apr. 24, 1960, gage height, 13.09 ft (3.990 m) present datum; minimum daily, 1 ft³/s (0.03 m³/s) Aug. 14-19, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,690 ft³/s (105 m³/s) Apr. 26, gage height, 8.72 ft (2.658 m); minimum, 14 ft³/s (0.40 m³/s) Mar. 12, 13, 25, gage height, 2.72 ft (0.829 m); minimum daily, 16 ft³/s (0.45 m³/s) Feb. 28, May 30, 31, June 26, 27, July 3, 4, Aug. 21.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	185	445	228	231	220	219	600	2070	258	215	220	255
2	186	379	235	230	220	268	601	1860	265	215	215	253
3	186	288	233	24	221	249	758	1490	266	16	344	250
4	343	286	231	230	215	276	846	1390	265	16	342	251
5	344	286	232	232	222	270	696	1180	266	217	413	252
6	347	280	230	230	222	268	682	1270	264	218	585	247
7	441	280	228	230	18	260	604	1770	258	219	581	382
8	453	22	231	232	223	261	605	1780	267	216	575	393
9	661	286	234	231	223	259	605	1360	215	182	295	397
10	664	282	233	229	223	264	597	1310	217	110	300	396
11	663	280	234	228	224	259	597	1340	216	290	304	402
12	405	284	233	231	235	259	596	1110	212	891	210	750
13	342	281	23	228	226	260	597	1090	18	898	212	935
14	345	283	203	229	18	262	753	1130	193	978	210	943
15	341	23	231	231	220	244	951	843	214	683	18	809
16	339	281	231	228	230	247	1720	616	283	617	214	610
17	342	289	233	209	230	180	2540	614	285	1070	207	616
18	348	285	233	229	225	178	1600	616	285	760	210	745
19	449	237	228	229	224	192	1510	612	212	623	212	609
20	666	238	25	148	222	192	1450	613	18	625	209	613
21	667	237	202	162	17	181	1160	611	216	413	16	617
22	667	24	223	221	220	180	934	615	216	416	39	741
23	668	237	214	215	222	155	1450	615	217	416	302	611
24	666	227	219	211	220	209	2250	599	218	217	486	615
25	665	234	220	211	220	190	3130	401	219	314	392	616
26	663	233	218	210	218	192	3360	500	16	265	394	618
27	648	231	25	208	216	189	3350	263	16	218	311	622
28	448	233	225	210	16	185	2850	314	217	415	301	609
29	444	230	230	217	---	189	2450	263	216	220	300	397
30	442	230	235	227	---	199	2270	16	216	370	256	399
31	443	---	231	17	---	354	---	16	---	220	254	---
TOTAL	14471	7431	6431	4398	5410	7110	42032	28197	6004	12543	8927	15953
MEAN	467	248	207	206	193	229	1401	910	200	405	288	532
MAX	668	445	235	232	235	354	3360	2070	267	1070	585	943
MIN	185	22	23	17	16	155	596	16	16	16	16	247
CFSM	1.35	.72	.60	.60	.56	.66	4.05	2.63	.58	1.17	.83	1.54
IN.	1.56	.80	.69	.69	.58	.76	4.52	3.03	.65	1.35	.96	1.72

CAL YR 1981 TOTAL 166525 MEAN 456 MAX 2460 MIN 21 CFSM 1.32 IN 17.90
WTR YR 1982 TOTAL 160907 MEAN 441 MAX 3360 MIN 16 CFSM 1.28 IN 17.30

04043004 STURGEON RIVER NEAR CHASSELL, MI
(National stream-quality accounting network station)

LOCATION.--Lat 46°58'28", long 88°31'21", in NE¼ SW¼ sec.20, T.53 N., R.33 W., Houghton County, Hydrologic Unit 04020104, 2.2 mi (3.5 km) upstream from bridge on county road, 3.5 mi (5.6 km) south of Chassell, and at mile 5.2 (8.4 km).

DRAINAGE AREA.--723 mi² (1,873 km²).

PERIOD OF RECORD.--Water years 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: March 1978 to September 1981.
WATER TEMPERATURES: March 1978 to September 1981.

REMARKS.--Bimonthly samples were collected during the year as a cross-section sample at bridge 2.2 mi (3.5 km) downstream or in the winter, through the ice in the vicinity of the gage site. Diurnal fluctuation and occasional slight regulation by powerplant at Prickett Dam at mile 45 (72 km). Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 267 micromhos Feb. 19, 1980; minimum daily, 46 micromhos Apr. 26, 27, 29, 1979.
WATER TEMPERATURES: Maximum daily, 26.0°C July 26, 1978, July 13, 1979; minimum daily, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV												
19...	0930	722	124	7.2	4.0	11.9	92	K7	27	57	2.0	16
JAN												
20...	1515	515	144	7.2	.0	12.8	88	K2	25	73	4.0	20
MAR												
02...	1045	529	170	7.2	.0	13.4	93	<1	380	84	1.0	23
MAY												
10...	1700	2720	56	7.5	11.0	9.6	89	K10	150	28	3.0	7.8
JUN												
23...	0840	603	116	7.4	17.5	8.4	88	28	82	56	.00	16
AUG												
11...	1115	805	122	7.4	18.0	8.2	87	44	177	64	3.0	18

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
NOV												
19...	4.2	2.0	7	1.0	55	5.1	2.3	<.1	8.3	97	72	.13
JAN												
20...	5.6	2.3	6	.9	69	4.1	2.2	<.1	10	109	87	.15
MAR												
02...	6.5	2.9	7	1.1	83	4.1	1.7	<.1	11	111	100	.15
MAY												
10...	2.0	1.1	8	.7	25	5.0	1.4	<.1	4.9	62	38	.08
JUN												
23...	4.0	1.9	7	.6	56	4.0	1.5	<.1	6.4	78	68	.11
AUG												
11...	4.7	2.4	7	.6	61	4.0	1.7	<.1	9.0	93	77	.13

STREAMS TRIBUTARY TO LAKE SUPERIOR

04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982--CONTINUED

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV												
19...	189	.09	.020	.03	.27	--	.03	.020	<.010	8	16	100
JAN												
20...	152	.15	.020	.03	.19	.020	.06	.010	<.010	7	9.7	100
MAR												
02...	159	.16	.040	.05	.29	.020	.06	<.010	<.010	6	8.6	100
MAY												
10...	455	<.10	.020	.03	.61	.050	.15	.010	<.010	97	712	50
JUN												
23...	127	<.10	.030	.04	.30	.030	.09	<.010	<.010	12	20	100
AUG												
11...	202	<.10	<.010	.01	.50	.040	.12	.010	.020	19	41	96

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
NOV										
19...	0930	1	1	100	25	--	1	30	20	1
JAN										
20...	1515	1	0	100	30	1	<1	20	10	1
MAY										
10...	1700	1	<1	<100	20	<1	<1	30	20	1
JUN										
23...	0840	1	1	<100	29	1	<1	20	10	3

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
NOV										
19...	<1	47	1	610	290	2	<1	50	24	<.1
JAN										
20...	<1	7	3	400	210	<1	<1	30	22	<.1
MAY										
10...	<1	18	7	1000	200	5	4	40	14	.9
JUN										
23...	<1	5	2	1100	240	7	2	60	16	<.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
NOV									
19...	<.1	2	<1	<1	<1	<1	<1	30	<4
JAN									
20...	<.1	2	<1	<1	<1	<1	<1	30	7
MAY									
10...	.4	2	<1	<1	<1	<1	<1	10	<3
JUN									
23...	<.1	2	<1	<1	<1	<1	<1	50	<4

04043050 TRAP ROCK RIVER NEAR LAKE LINDEN, MI

LOCATION.--Lat 47°13'43", long 88°23'07", in SE¼ SE¼ sec.20, T.56 N., R.32 W., Houghton County, Hydrologic Unit 04020103, on right bank 20 ft (6 m) upstream from bridge on county highway, 2.0 mi (3.2 km) northeast of Lake Linden, and 3.0 mi (4.8 km) upstream from mouth.

DRAINAGE AREA.--28.0 mi² (72.5 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Datum of gage is 621.7 ft (189.49 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. From April 1973 to December 1977, flow includes about 0.1 ft³/s (0.003 m³/s) mine pumpage. Small diversions for sprinkler irrigation.

AVERAGE DISCHARGE.--16 years, 45.0 ft³/s (1.274 m³/s), 21.82 in/yr (554 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,590 ft³/s (45.0 m³/s) May 10, 1979, gage height, 10.72 ft (3.267 m); minimum daily, 6.8 ft³/s (0.19 m³/s) Oct. 3, 1976; minimum gage height, 3.85 ft (1.173 m) June 23, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 380 ft³/s (10.8 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Apr. 25	2400	*1110	31.4	*9.67	2.947	May 10	1700	404	11.4	6.48	1.975
May 6	1200	496	14.0	7.12	2.170						

Minimum discharge, 9.8 ft³/s (0.28 m³/s) Feb. 24, gage height, 3.88 ft (1.183 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	41	22	19	17	16	16	60	366	36	14	18	16
2	43	20	20	17	16	15	62	404	29	14	17	25
3	29	19	20	17	16	15	65	340	26	14	24	24
4	23	19	19	17	16	15	70	274	24	16	26	19
5	22	18	19	17	16	15	80	248	22	15	23	17
6	29	20	18	17	15	15	70	418	21	15	21	16
7	38	19	19	17	15	15	60	298	20	14	27	15
8	28	18	19	17	15	15	55	172	19	14	30	15
9	23	17	19	17	15	16	47	123	19	14	25	14
10	21	17	18	17	15	15	44	278	25	24	24	14
11	20	17	18	17	15	15	40	228	22	195	21	16
12	20	17	17	16	15	15	41	139	21	165	19	19
13	19	16	17	16	15	16	56	182	20	59	17	17
14	23	16	17	16	15	17	63	200	19	37	17	17
15	29	16	17	16	15	19	101	128	18	29	17	18
16	25	16	17	16	15	19	186	93	18	28	16	24
17	22	17	17	16	15	18	276	78	18	99	15	23
18	35	18	17	16	16	18	228	88	18	90	15	25
19	32	16	17	16	16	17	170	79	18	44	15	22
20	30	16	17	16	16	17	134	64	17	31	15	23
21	35	16	18	16	16	17	112	54	17	25	14	21
22	28	16	18	16	15	17	106	47	17	23	18	19
23	26	16	18	16	15	18	328	42	16	21	21	18
24	25	16	17	16	15	21	772	37	16	19	19	25
25	24	16	17	16	15	24	998	34	16	19	17	25
26	23	17	17	16	15	22	803	32	16	18	23	22
27	24	24	17	16	15	21	480	29	15	18	20	20
28	29	25	17	16	15	21	416	27	15	17	17	18
29	28	22	17	16	---	21	443	26	15	17	16	18
30	26	20	17	16	---	30	436	25	15	22	16	23
31	24	---	17	16	---	50	---	26	---	20	16	---
TOTAL	844	542	551	507	429	585	6802	4579	588	1150	599	588
MEAN	27.2	18.1	17.8	16.4	15.3	18.9	227	148	19.6	37.1	19.3	19.6
MAX	43	25	20	17	16	50	998	418	36	195	30	25
MIN	19	16	17	16	15	15	40	25	15	14	14	14
CFSM	.97	.65	.64	.59	.55	.68	8.11	5.29	.70	1.33	.69	.70
IN.	1.12	.72	.73	.67	.57	.78	9.04	6.08	.78	1.53	.80	.78

CAL YR 1981 TOTAL 16509 MEAN 45.2 MAX 474 MIN 11 CFSM 1.61 IN 21.93
WTR YR 1982 TOTAL 17764 MEAN 48.7 MAX 998 MIN 14 CFSM 1.74 IN 23.60

04043050 TRAP ROCK RIVER NEAR LAKE LINDEN, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1971 to current year.

INSTRUMENTATION.--Temperature recorder since Oct. 1, 1971.

REMARKS.--Temperature recorder clock stopped Sept. 3-21 (range in temperature 8.5 to 17.5°C). Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 24.5°C July 30, 1975; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 21.0°C July 6, 7; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	7.5	6.0	8.5	7.0	1.5	1.0	.5	.0	.0	.0	.0	.0
2	7.5	5.5	7.5	6.5	1.5	1.0	.0	.0	.0	.0	.0	.0
3	7.5	5.0	7.0	5.0	2.0	1.5	.0	.0	.0	.0	.5	.0
4	7.5	6.5	6.5	5.0	2.0	1.5	.0	.0	.0	.0	.5	.5
5	9.0	7.5	6.5	6.0	1.5	1.0	.0	.0	.0	.0	.5	.5
6	9.5	8.5	6.5	5.0	1.0	.5	.0	.0	.0	.0	.5	.5
7	9.5	8.0	5.0	3.5	1.5	1.0	.0	.0	.0	.0	.5	.5
8	8.5	7.0	5.0	4.0	1.0	.5	.0	.0	.0	.0	1.0	.5
9	9.0	7.5	4.0	3.0	.5	.0	.0	.0	.0	.0	1.0	1.0
10	9.0	8.0	4.0	3.0	.0	.0	.0	.0	.0	.0	1.0	1.0
11	9.0	8.5	4.0	3.5	.5	.0	.0	.0	.0	.0	1.0	1.0
12	10.0	7.5	4.5	3.0	1.0	.5	.0	.0	.0	.0	1.0	1.0
13	10.0	7.5	4.5	3.0	2.0	1.0	.0	.0	.0	.0	1.0	1.0
14	10.0	10.0	5.0	3.5	2.0	1.5	.0	.0	.0	.0	1.0	1.0
15	10.0	8.0	6.5	5.0	1.5	.5	.0	.0	.0	.0	1.0	1.0
16	8.5	7.0	6.5	6.5	.5	.5	.0	.0	.0	.0	1.5	1.0
17	8.0	7.0	6.5	6.0	.5	.5	.0	.0	.0	.0	3.0	1.5
18	7.5	5.0	6.0	4.5	.5	.5	.0	.0	.0	.0	3.0	2.0
19	5.0	4.0	4.5	3.5	.5	.5	.0	.0	.0	.0	3.0	1.0
20	5.5	4.5	3.5	2.0	.5	.5	.0	.0	.0	.0	2.0	1.5
21	5.5	4.5	2.0	2.0	.5	.0	.0	.0	.0	.0	4.0	1.5
22	5.0	4.0	2.0	1.5	.0	.0	.0	.0	.0	.0	4.5	1.5
23	4.5	3.5	1.5	1.0	.0	.0	.0	.0	.0	.0	4.5	1.0
24	3.5	2.5	2.0	1.0	.0	.0	.0	.0	.0	.0	4.5	2.5
25	4.0	3.5	3.0	2.0	.0	.0	.0	.0	.0	.0	3.0	1.5
26	5.0	3.5	3.0	3.0	.0	.0	.0	.0	.0	.0	2.0	1.0
27	5.5	4.0	3.0	2.5	.0	.0	.0	.0	.0	.0	2.5	1.0
28	5.5	5.5	2.5	2.0	.5	.0	.0	.0	.0	.0	2.0	1.0
29	7.0	5.5	2.0	1.0	.5	.0	.0	.0	---	---	4.5	2.0
30	8.0	6.5	1.5	1.5	.5	.0	.0	.0	---	---	4.0	2.5
31	9.0	8.0	---	---	.5	.5	.0	.0	---	---	3.5	2.0
MONTH	10.0	2.5	8.5	1.0	2.0	.0	.5	.0	.0	.0	4.5	.0

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	2.5	1.0	8.0	3.0	13.0	9.5	18.5	12.5	18.5	15.0	14.5	13.0
2	1.5	1.0	8.5	4.0	13.5	10.0	19.0	13.5	16.5	13.5	15.0	13.5
3	1.5	1.0	8.5	5.5	14.0	8.5	18.0	14.0	17.0	14.5	---	---
4	1.0	1.0	8.5	6.0	15.0	9.0	16.5	13.0	16.0	14.5	---	---
5	1.0	1.0	8.5	8.0	15.5	10.0	20.0	13.5	17.0	14.5	---	---
6	1.0	1.0	8.5	7.5	15.0	10.0	21.0	17.5	18.0	15.5	---	---
7	1.0	1.0	9.0	6.0	15.0	12.0	21.0	17.5	17.5	15.5	---	---
8	2.0	1.0	10.0	6.5	15.5	12.0	20.0	15.5	18.5	15.5	---	---
9	3.0	1.0	9.5	7.5	14.0	11.5	19.0	14.5	17.0	14.5	---	---
10	2.0	1.5	10.0	7.5	14.0	11.0	14.5	13.0	16.0	13.0	---	---
11	4.0	2.0	11.5	8.5	15.0	10.5	14.0	13.0	17.0	12.5	---	---
12	3.0	2.0	11.5	10.0	15.5	11.0	16.5	13.0	17.0	13.0	---	---
13	4.0	2.0	10.0	8.5	15.5	11.5	17.5	14.0	16.5	13.5	---	---
14	4.5	1.5	13.0	8.5	14.5	11.5	19.0	16.0	18.5	15.0	---	---
15	3.5	1.5	14.5	12.0	13.5	11.5	19.0	15.5	19.0	16.0	---	---
16	1.5	1.0	14.0	12.0	14.0	9.0	19.0	16.5	20.0	16.5	---	---
17	1.0	1.0	12.0	10.5	14.5	11.5	20.5	17.0	18.5	15.0	---	---
18	2.0	1.0	13.0	11.0	13.5	10.5	20.0	17.5	17.5	14.5	---	---
19	3.0	1.0	13.0	11.5	16.5	11.0	19.0	15.5	19.5	15.5	---	---
20	2.0	1.0	12.0	9.5	17.0	12.5	19.5	15.0	18.5	15.5	---	---
21	3.5	1.0	12.0	8.0	16.5	12.0	18.5	16.0	17.0	14.0	---	---
22	4.5	1.0	12.5	8.5	16.5	12.0	20.5	15.5	17.0	15.0	10.5	7.5
23	3.5	1.0	13.5	9.5	17.0	11.5	20.0	15.0	17.0	14.0	10.0	8.0
24	2.0	1.0	14.5	10.0	15.5	12.5	18.5	15.0	16.0	13.5	9.0	8.5
25	2.5	1.0	15.5	11.0	16.5	12.5	18.5	16.0	16.0	13.0	9.5	8.0
26	4.0	1.0	15.5	12.0	16.5	11.5	18.5	15.5	15.5	13.5	10.5	8.0
27	5.0	1.0	15.5	12.0	17.0	12.5	19.5	15.0	14.5	12.5	10.5	8.5
28	6.0	1.5	16.5	12.0	16.0	13.5	20.5	15.5	14.0	11.0	10.0	9.5
29	7.0	2.0	17.0	13.0	17.0	12.0	19.0	16.0	13.0	10.5	11.0	10.5
30	5.0	2.5	17.5	13.5	17.0	12.5	18.0	15.5	15.0	12.0	12.5	11.0
31	---	---	15.5	10.5	---	---	19.0	15.0	14.5	12.5	---	---
MONTH	7.0	1.0	17.5	3.0	17.0	8.5	21.0	12.5	20.0	10.5		

STREAMS TRIBUTARY TO LAKE SUPERIOR

04044400 CARP RIVER NEAR NEGAUNEE, MI

LOCATION.--Lat 46°31'29", long 87°34'25", in SW¼ sec.29, T.48 N., R.26 W., Marquette County, Hydrologic Unit 04020105, on right bank 30 ft (9 m) downstream from bridge on U.S. Highway 41, and 2.0 mi (3.2 km) northeast of Negaunee.

DRAINAGE AREA.--51.4 mi² (133.1 km²).

PERIOD OF RECORD.--July 1961 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,319.90 ft (402.306 m) Michigan Department of Highway and Transportation datum. Prior to Aug. 24, 1961, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated by Deer Lake storage reservoir (capacity, 22,500 acre-ft or 27.7 hm³) 5 mi (8 km) upstream. The city of Ishpeming diverted an average of 2.2 ft³/s (0.062 m³/s) into basin as waste effluent (station 04058200). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 61.1 ft³/s (1.730 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 351 ft³/s (9.94 m³/s) June 27, 28, 1968, gage height, 4.68 ft (1.426 m); maximum gage height, 5.24 ft (1.597 m) Mar. 2, 1972, backwater from ice; minimum discharge, 3.7 ft³/s (0.10 m³/s) July 29, 1965; minimum gage height, 1.94 ft (0.591 m) Aug. 1, 1962; minimum daily discharge, 3.9 ft³/s (0.11 m³/s) July 29, 30, 1965.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 251 ft³/s (7.11 m³/s) Apr. 25, gage height, 4.18 ft (1.274 m); minimum, 15 ft³/s (0.42 m³/s) Apr. 4, gage height, 2.31 ft (0.704 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	75	56	56	66	66	64	79	101	75	44	53	47
2	90	55	68	68	64	62	50	97	74	35	48	53
3	78	54	81	66	62	59	53	86	73	34	117	53
4	68	54	80	68	62	58	41	76	73	38	126	53
5	64	53	78	70	62	58	64	73	72	40	72	53
6	67	55	78	72	64	56	46	83	71	38	55	53
7	69	54	76	68	66	56	42	107	71	37	50	52
8	64	54	76	66	66	56	41	75	70	36	47	52
9	60	53	76	64	64	56	38	59	71	36	47	52
10	57	52	76	66	62	58	37	71	76	41	46	52
11	55	53	76	68	62	60	36	71	75	86	44	52
12	54	52	76	70	62	60	38	75	72	117	43	51
13	54	52	76	70	62	62	46	78	72	77	42	47
14	55	52	76	70	62	68	47	79	74	59	41	44
15	55	52	76	70	62	60	66	72	77	57	41	48
16	55	52	74	68	62	60	92	69	74	64	41	56
17	56	52	74	68	62	60	107	67	72	66	40	50
18	77	52	72	68	62	59	92	72	72	64	39	46
19	87	52	72	68	62	59	78	72	62	60	39	43
20	75	54	70	66	62	59	65	87	53	56	39	42
21	69	54	70	64	62	59	82	89	53	53	39	42
22	64	53	70	62	62	58	55	83	54	51	46	42
23	62	52	70	64	63	58	84	80	52	50	49	43
24	60	52	70	68	63	60	167	78	49	49	45	48
25	58	51	70	70	62	60	241	77	49	49	44	54
26	58	52	70	68	62	60	213	76	48	48	43	56
27	58	54	70	68	62	59	137	75	47	47	46	51
28	58	56	70	66	66	59	107	76	46	46	46	49
29	57	56	68	66	---	59	110	76	46	47	45	49
30	56	56	66	66	---	66	114	76	46	64	45	57
31	56	---	66	66	---	81	---	76	---	64	44	---
TOTAL	1971	1599	2247	2088	1760	1869	2468	2432	1919	1653	1562	1490
MEAN	63.6	53.3	72.5	67.4	62.9	60.3	82.3	78.5	64.0	53.3	50.4	49.7
MAX	90	56	81	72	66	81	241	107	77	117	126	57
MIN	54	51	56	62	62	56	36	59	46	34	39	42

CAL YR 1981 TOTAL 20001 MEAN 54.8 MAX 122 MIN 28
WTR YR 1982 TOTAL 23058 MEAN 63.2 MAX 241 MIN 34

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI
(National stream-quality accounting network and pesticide station)

LOCATION.--Lat 46°34'30", long 85°16'10", in NE¼ sec.11, T.48 N., R.8 W., Luce County, Hydrologic Unit 04020202, on left bank 0.7 mi (1.1 km) upstream from Tahquamenon (Big) Falls, 11.5 mi (18.5 km) west of Tahquamenon Paradise, and 19 mi (31 km) northeast of Newberry.

DRAINAGE AREA.--790 mi² (2,046 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1953 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 697 ft (212.4 m) from river-profile map (nearest ft).

REMARKS.--Water-discharge records good.

AVERAGE DISCHARGE.--29 years, 936 ft³/s (26.51 m³/s), 16.09 in/yr (409 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,990 ft³/s (198 m³/s) May 10, 1960, gage height, 10.26 ft (3.127 m); minimum, 157 ft³/s (4.45 m³/s) July 26, 1955; minimum gage height, 2.86 ft (0.872 m) July 7, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,140 ft³/s (146 m³/s) Apr. 29, gage height, 9.03 ft (2.752 m); minimum, 217 ft³/s (6.15 m³/s) July 9, 10; minimum gage height, 3.04 ft (0.927 m) July 9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	334	1160	681	402	435	396	1130	5030	384	271	397	573
2	405	1090	726	401	435	393	1210	4920	371	254	392	801
3	475	1030	795	403	437	395	1310	4770	367	250	505	998
4	506	945	839	403	441	394	1380	4580	350	247	939	1070
5	509	871	852	399	439	391	1450	4380	330	249	1130	1070
6	521	812	852	400	441	389	1520	4190	317	243	1190	1120
7	570	814	829	409	442	389	1570	4000	305	235	1200	1170
8	604	770	795	415	445	389	1610	3760	280	237	1160	1200
9	617	752	709	419	449	389	1640	3540	283	229	1100	1200
10	624	729	672	434	455	385	1680	3360	285	226	1000	1160
11	624	686	662	427	457	382	1690	3240	297	246	887	1110
12	617	668	649	417	460	382	1690	3050	290	329	764	1020
13	602	640	629	413	462	426	1700	2890	289	443	651	915
14	583	619	594	420	460	456	1750	2700	292	481	555	849
15	583	602	558	430	456	485	1860	2480	299	571	489	901
16	627	582	527	435	441	516	2050	2240	322	623	431	972
17	655	565	497	443	433	538	2350	2020	351	636	394	1040
18	766	559	476	438	429	554	2530	1830	356	640	370	1130
19	1040	551	465	437	429	568	2700	1630	354	629	353	1220
20	1190	534	461	437	423	583	2800	1470	351	607	343	1290
21	1330	526	454	437	408	598	2900	1330	340	558	343	1360
22	1420	511	444	443	403	611	3000	1190	332	485	357	1410
23	1470	489	447	459	395	628	3140	1040	335	434	408	1410
24	1500	461	446	464	396	662	3470	874	339	398	464	1380
25	1490	452	430	465	399	713	4100	740	327	359	484	1420
26	1470	442	410	461	403	754	4670	631	345	341	483	1470
27	1440	492	408	457	398	797	4910	548	336	319	501	1470
28	1400	590	411	453	395	832	5050	490	310	298	547	1460
29	1350	665	409	447	---	849	5100	454	290	289	561	1440
30	1300	679	404	442	---	887	5100	419	278	286	545	1350
31	1230	---	400	436	---	1010	---	407	---	365	535	---
TOTAL	27852	20286	17931	13346	12066	17141	77060	74203	9705	11778	19478	34979
MEAN	898	676	578	431	431	553	2569	2394	324	380	628	1166
MAX	1500	1160	852	465	462	1010	5100	5030	384	640	1200	1470
MIN	334	442	400	399	395	382	1130	407	278	226	343	573
CFSM	1.14	.86	.73	.55	.55	.70	3.25	3.03	.41	.48	.80	1.48
IN.	1.31	.96	.84	.63	.57	.81	3.63	3.49	.46	.55	.92	1.65

CAL YR 1981 TOTAL 309379 MEAN 848 MAX 4700 MIN 257 CFSM 1.07 IN 14.57
WTR YR 1982 TOTAL 335825 MEAN 920 MAX 5100 MIN 226 CFSM 1.17 IN 15.81

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967, 1973 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to September 1981.
WATER TEMPERATURES: October 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor October 1975 to September 1981.

REMARKS.--Bimonthly samples were collected during the year as a cross-section sample at cableway 40 ft (12 m) downstream from gage or by wading 300 ft (91 m) to 1000 ft (305 m) downstream. Complete ice cover during the winter period at gage. Beginning 300 ft (91 m) downstream, no significant ice cover. Daily record for water year 1975 from once-daily observer samples.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded (water years 1976-81), 238 micromhos Jan. 24, 1977; minimum (water years 1976, 1978-81), 34 micromhos Apr. 17, 18, 1976.
WATER TEMPERATURES (water years 1976-81): Maximum, 26.5°C May 21, 1977; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV												
04...	1305	946	115	7.2	6.0	8.8	72	K3	16	54	17	15
JAN												
26...	1415	460	168	7.2	.0	6.1	43	K4	88	80	15	22
MAR												
09...	1445	388	178	7.6	.0	5.8	40	22	23	88	12	24
APR												
21...	1400	2880	68	6.7	.0	8.2	57	K1	--	34	8.0	9.3
JUN												
03...	1420	384	151	7.5	19.5	7.1	78	K6	19	75	11	21
AUG												
30...	1245	540	164	7.5	16.0	8.0	82	27	42	87	15	25

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
NOV												
04...	3.9	1.4	5	.3	37	12	2.3	.1	6.3	95	64	.13
JAN												
26...	6.0	2.0	5	.7	65	13	2.1	<.1	9.6	118	95	.16
MAR												
09...	6.7	2.2	5	.9	76	14	1.7	<.1	10	118	105	.16
APR												
21...	2.5	1.1	7	.7	26	8.0	1.3	<.1	5.3	72	44	.10
JUN												
03...	5.5	1.8	5	.8	64	10	2.0	<.1	4.7	104	85	.14
AUG												
30...	6.0	2.6	6	.3	72	12	2.0	<.1	8.0	138	99	.19

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982--CONTINUED

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV												
04...	243	.09	.020	.03	.61	.020	.06	.020	<.010	4	10	100
JAN												
26...	147	.28	.030	.04	.43	.030	.52	.030	.010	2	2.5	100
MAR												
09...	124	.16	.040	.05	.35	.020	.06	.020	<.010	5	5.2	100
APR												
21...	560	.11	.040	.05	1.60	.030	.09	.010	<.010	5	39	100
JUN												
03...	108	.26	<.010	.01	.30	--	--	.020	<.010	16	17	94
AUG												
30...	201	.33	.060	.03	1.90	.170	.52	.020	<.010	5	7.3	100

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
NOV										
04...	1305	1	1	100	19	<1	<1	20	10	<1
JAN										
26...	1415	1	1	<100	21	<1	--	20	10	<1
APR										
21...	1400	1	1	<100	18	1	<1	10	<10	<1
JUN										
03...	1420	1	<1	<100	26	<1	1	10	<10	<1

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
NOV										
04...	1	4	1	490	280	6	2	--	14	--
JAN										
26...	<1	8	3	590	340	8	3	50	49	<.1
APR										
21...	<1	15	3	580	310	6	2	30	19	<.1
JUN										
03...	1	3	2	870	490	7	5	100	36	<.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
NOV									
04...	.2	<1	<1	<1	<1	<1	<1	40	5
JAN									
26...	<.1	1	<1	<1	<1	<1	<1	10	6
APR									
21...	<.1	3	3	<1	<1	<1	<1	30	8
JUN									
03...	<.1	<1	1	<1	<1	<1	<1	30	10

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982--CONTINUED

PESTICIDE ANALYSES

DATE	TIME	PCB, TOTAL (UG/L)	PCB, TOTAL IN BOTTOM MATERIAL (UG/KG)	ALDRIN, TOTAL (UG/L)	ALDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	CHLORDANE, TOTAL (UG/L)	CHLORDANE, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDD, TOTAL (UG/L)	DDD, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDE, TOTAL (UG/L)	DDE, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDT, TOTAL (UG/L)
NOV												
04...	1305	--	6	--	<.1	--	2.0	--	.7	--	.4	--
MAR												
09...	1445	<.10	--	<.01	--	<.10	--	<.01	--	<.01	--	<.01
APR												
21...	1400	<.10	<1	<.01	<.1	<.10	<1.0	<.01	<.1	<.01	<.1	<.01

DATE	DDT, TOTAL IN BOTTOM MATERIAL (UG/KG)	DIAZINON, TOTAL (UG/L)	DIELDRIN TOTAL (UG/L)	DIELDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ENDOSULFAN, TOTAL (UG/L)	ENDOSULFAN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ENDRIN, TOTAL (UG/L)	ENDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ETHION, TOTAL (UG/L)	HEPTACHLOR, TOTAL (UG/L)	HEPTACHLOR, TOTAL IN BOTTOM MATERIAL (UG/KG)	HEPTACHLOR EPOXIDE TOTAL (UG/L)
NOV												
04...	.6	--	--	.5	--	<.1	--	<.1	--	--	<.1	--
MAR												
09...	--	<.01	<.01	--	<.01	--	<.01	--	<.01	<.01	--	<.01
APR												
21...	<.1	--	<.01	<.1	<.01	<.1	<.01	<.1	--	<.01	<.1	<.01

DATE	HEPTACHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG)	LINDANE TOTAL (UG/L)	LINDANE TOTAL IN BOTTOM MATERIAL (UG/KG)	MALATHION, TOTAL (UG/L)	METHOXYCHLOR, TOTAL (UG/L)	METHOXYCHLOR, TOT. IN BOTTOM MATL. (UG/KG)	METHYL PARATHION, TOTAL (UG/L)	METHYL TRITHION, TOTAL (UG/L)	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L)	PCN, TOTAL IN BOTTOM MATERIAL (UG/KG)	MIREX, TOTAL (UG/L)
NOV											
04...	<.1	--	<.1	--	--	<.1	--	--	--	<1.0	--
MAR											
09...	--	<.01	--	<.01	<.01	--	<.01	<.01	<.10	--	<.01
APR											
21...	<.1	<.01	<.1	--	<.01	<.1	--	--	<.10	<1.0	<.01

DATE	MIREX, TOTAL IN BOTTOM MATERIAL (UG/KG)	PARATHION, TOTAL (UG/L)	PERTHANE IN BOTTOM MATL. (UG/KG)	PERTHANE TOTAL (UG/L)	TOXAPHENE, TOTAL (UG/L)	TOXAPHENE, TOTAL IN BOTTOM MATERIAL (UG/KG)	TOTAL TRITHION (UG/L)	2,4-D, TOTAL (UG/L)	2,4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
NOV											
04...	<.1	--	<1.00	--	--	<10	--	--	--	--	--
MAR											
09...	--	<.01	--	<.10	<1	--	<.01	<.01	<.01	<.01	<.01
APR											
21...	<.1	--	<1.00	<.10	<1	<10	--	<.01	<.01	<.01	<.01

04045580 ST. MARYS RIVER ABOVE SAULT STE. MARIE, MI
(National stream-quality accounting network and radiochemical station)

LOCATION.--Lat 46°29'29", long 84°25'17", in NW¼ sec.10, T.47 N., R.1 W., Chippewa County, Hydrologic Unit 04020300, at Sault Ste. Marie municipal raw-water intake at Big Point, 2.6 mi (4.2 km) west of the International Bridge, at Sault Ste. Marie.

DRAINAGE AREA.--80,900 mi² (210,000 km²), approximately.

PERIOD OF RECORD.--Water years 1970 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: March 1974 to September 1981.
WATER TEMPERATURES: March 1974 to September 1981.

REMARKS.--Bimonthly samples were collected during the year at the raw-water tap in Sault Ste. Marie municipal water plant at Big Point. Intake is 1,500 ft (457 m) out at a depth of 30 ft (9 m), 10 ft (3 m) above bottom of channel.

COOPERATION.--Discharge figures are monthly means furnished by U.S. Army Corps of Engineers, Sault Ste. Marie.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 113 micromhos Oct. 26, 1980; minimum daily, 76 micromhos Apr. 24, 1975.
WATER TEMPERATURES: Maximum daily, 24.0°C July 25, 1979; minimum daily, 0.0°C Mar. 14, 15, 1974, Feb. 1, 1979.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)
NOV											
05...	0935	44200	98	7.8	10.0	12.0	102	<1	K1	43	1.0
JAN											
27...	0900	45400	96	7.1	2.5	13.6	96	<1	<1	47	7.0
MAR											
10...	0915	45400	94	7.1	3.5	13.8	98	<1	<1	47	3.0
APR											
20...	1710	46100	94	7.2	3.0	13.2	92	<1	K1	44	1.0
JUN											
04...	0920	74100	99	7.4	7.0	11.9	114	K2	<1	44	.00
AUG											
31...	0915	84300	96	7.8	14.0	10.1	100	<1	K1	46	3.0

DATE	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)
NOV											
05...	13	2.6	1.3	6	.5	42	5.4	1.3	.1	2.3	52
JAN											
27...	14	2.9	1.3	6	.5	40	2.4	1.3	<.1	2.3	58
MAR											
10...	14	2.8	1.4	6	.5	44	4.4	1.2	<.1	2.3	54
APR											
20...	13	2.7	1.4	6	.6	43	3.0	1.2	<.1	2.4	58
JUN											
04...	13	2.8	1.2	6	.5	45	4.0	1.6	<.1	2.3	54
AUG											
31...	14	2.7	1.2	5	.2	43	3.0	1.2	<.1	2.0	80

DATE	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)
NOV											
05...	56	.07	6210	.27	<.010	.01	.52	<.010	--	<.010	<.010
JAN											
27...	60	.08	7110	.33	<.010	.01	.31	.010	.15	.010	<.010
MAR											
10...	53	.07	6620	.31	.010	.01	<.10	.010	.03	.010	.020
APR											
20...	58	.08	7220	.31	.020	.03	3.10	<.010	--	<.010	<.010
JUN											
04...	53	.07	10800	<.10	.030	.04	.70	.040	.12	.020	<.010
AUG											
31...	50	.11	18200	<.10	.020	.03	.70	.020	.06	.010	<.010

STREAMS TRIBUTARY TO LAKE SUPERIOR

04045580 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
NOV										
05...	0935	1	1	100	14	<1	<1	20	10	<1
JAN										
27...	0900	1	1	<100	13	<1	--	20	10	<1
APR										
20...	1710	1	1	<100	15	<1	<1	10	<10	<1
JUN										
04...	0920	1	<1	<100	15	<1	<1	10	<10	<1

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
NOV										
05...	1	6	2	50	8	2	1	<10	<1	--
JAN										
27...	<1	7	3	40	16	7	1	<10	1	<.1
APR										
20...	<1	17	5	30	9	3	1	<10	<1	--
JUN										
04...	--	3	2	80	<3	<1	1	10	<1	<.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
NOV									
05...	.7	<1	1	<1	<1	<1	<1	60	33
JAN									
27...	<.1	1	<1	<1	<1	<1	<1	--	36
APR									
20...	.2	3	3	<1	<1	<1	<1	90	67
JUN									
04...	<.1	<1	<1	<1	<1	<1	<1	90	73

RADIOCHEMICAL ANALYSES

DATE	TIME	GROSS ALPHA, DIS-SOLVED (UG/L AS U-NAT)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT)	GROSS BETA, DIS-SOLVED (PCI/L AS CS-137)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137)	GROSS BETA, DIS-SOLVED (PCI/L AS SR/YT-90)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/YT-90)	RADIUM 226, DIS-SOLVED, RADON METHOD (PCI/L)	URANIUM DIS-SOLVED, EXTRAC-TION (UG/L)
NOV									
05...	0935	<1.2	<.4	1.8	<.4	1.7	<.4	.05	.09
APR									
20...	1710	<.9	<.4	1.3	<.4	1.2	<.4	.08	.18

04056500 MANISTIQUE RIVER NEAR MANISTIQUE, MI

LOCATION.--Lat 46°01'50", long 86°09'40", in SE¼ sec.15, T.42 N., R.15 W., Schoolcraft County, Hydrologic Unit 04060106, on left bank 1.0 mi (1.6 km) downstream from West Branch, 6.0 mi (9.7 km) northeast of Manistique, and at mile 19.5 (31.4 km).

DRAINAGE AREA.--1,100 mi² (2,849 km²), approximately.

PERIOD OF RECORD.--March 1938 to current year.

REVISED RECORDS.--WSP 1387: 1940-42(M), 1943, 1945. WSP 1627, 1727: 1938, 1939.

GAGE.--Water-stage recorder. Altitude of gage is 608 ft (185.3 m) from river-profile map (nearest ft). Prior to July 15, 1939, non-recording gage at site 1,600 ft (487.7 m) upstream at different datum.

REMARKS.--Records good except those for the winter period and periods of no gage-height record, Feb. 7 to Mar. 16, May 19 to July 15, which are fair. Since July 1948, slight regulation by dam on outlet of Manistique Lake. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--44 years, 1,441 ft³/s (40.81 m³/s), 17.79 in/yr (452 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 16,900 ft³/s (479 m³/s) May 11, 1960, gage height, 12.85 ft (3.917 m); minimum, 288 ft³/s (8.16 m³/s) Oct. 4, 1948; minimum gage height, 1.01 ft (0.308 m) Aug. 23, 1941.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 8,590 ft³/s (243 m³/s) Apr. 28, gage height, 11.21 ft (3.417 m); minimum recorded, 514 ft³/s (14.6 m³/s) Oct. 1, but may have been less during period of no gage-height record, May 19 to July 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	547	1590	1240	720	800	720	1900	7090	1050	660	977	780
2	621	1570	1240	720	800	720	2100	6550	1000	640	962	812
3	709	1510	1280	720	800	720	2300	6050	980	620	947	908
4	771	1430	1320	700	800	700	2400	5610	940	600	1050	989
5	782	1370	1320	720	800	680	2500	5220	900	580	1180	999
6	776	1370	1290	720	800	680	2650	4950	860	580	1210	1090
7	813	1410	1270	720	800	680	2700	4670	830	580	1150	1220
8	889	1450	1270	740	800	680	2800	4400	810	580	1090	1240
9	937	1430	1260	760	820	680	2850	4150	800	570	1030	1210
10	924	1380	1190	780	830	690	2900	3910	800	560	963	1190
11	864	1340	1090	760	840	700	2950	3680	800	600	900	1120
12	801	1290	1000	740	840	730	3000	3480	800	800	850	1060
13	753	1260	950	740	840	780	3000	3320	800	1100	809	1010
14	748	1230	900	760	840	860	3050	3170	800	1400	789	1040
15	809	1200	850	770	820	940	3220	3060	820	1500	755	1180
16	890	1180	750	780	810	1000	3530	2920	840	1770	729	1350
17	948	1150	720	790	800	1050	4120	2760	860	1930	712	1470
18	1140	1130	700	800	780	1050	4800	2610	880	2070	693	1600
19	1530	1100	680	800	770	1100	5260	2460	900	2180	668	1680
20	1860	1080	680	800	760	1100	5610	2200	900	2160	644	1700
21	2020	1080	680	800	750	1100	5760	1950	900	2010	624	1700
22	2080	1060	680	810	740	1100	5620	1800	900	1720	646	1660
23	2130	1030	680	820	730	1200	5560	1650	900	1450	696	1610
24	2110	962	680	830	720	1250	5740	1550	880	1270	738	1580
25	2060	1010	700	830	720	1350	6270	1450	850	1160	762	1650
26	1990	1000	700	830	720	1400	7210	1350	820	1080	758	1760
27	1930	1030	700	830	720	1450	8210	1300	780	1020	763	1810
28	1840	1130	700	820	720	1500	8470	1250	740	983	784	1820
29	1780	1210	720	820	---	1500	8170	1200	720	931	802	1770
30	1710	1250	720	800	---	1550	7640	1150	700	915	805	1680
31	1650	---	720	800	---	1750	---	1100	---	914	790	---
TOTAL	39412	37232	28680	24030	21970	31410	132290	98010	25560	34933	26276	40688
MEAN	1271	1241	925	775	785	1013	4410	3162	852	1127	848	1356
MAX	2130	1590	1320	830	840	1750	8470	7090	1050	2180	1210	1820
MIN	547	962	680	700	720	680	1900	1100	700	560	624	780
CFSM	1.16	1.13	.84	.71	.71	.92	4.01	2.88	.78	1.03	.77	1.23
IN.	1.33	1.26	.97	.81	.74	1.06	4.47	3.31	.86	1.18	.89	1.38

CAL YR 1981 TOTAL 513454 MEAN 1407 MAX 7620 MIN 494 CFSM 1.28 IN 17.36
WTR YR 1982 TOTAL 540491 MEAN 1481 MAX 8470 MIN 547 CFSM 1.35 IN 18.28

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°58'18", long 86°14'35", in SE¼ SE¼ sec.1, T.41 N., R.16 W., Schoolcraft County, Hydrologic Unit 04060106, at Wyman State Nursery, 0.7 mi (1.1 km) downstream from Indian River, 0.8 mi (1.3 km) upstream from U.S. Highway 2, and 1.8 mi (2.9 km) upstream from mouth.

DRAINAGE AREA.--1,445 mi² (3,743 km²), approximately.

PERIOD OF RECORD.--Water years 1976 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1975 to September 1981.
WATER TEMPERATURES: October 1975 to September 1981.

INSTRUMENTATION.--Water-quality monitor October 1975 to September 1981.

REMARKS.--Bimonthly samples were collected during the year as a cross-section sample at the Wyman State Nursery site or at railroad bridge 1,200 ft (366 m) downstream. Occasional regulation by dam 0.4 mi (0.6 km) downstream. Intermittent ice cover during the winter period. Prior to Oct. 1, 1975, water quality data collected at station 04057005 Manistique River at Manistique, MI, 1.5 mi (2.4 km) downstream.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 254 micromhos Nov. 24, 1977; minimum (water years 1976, 1979-81), 57 micromhos Apr. 25, 1979.
WATER TEMPERATURES: Maximum (water years 1976-80), 26.5°C July 15, 23, 1979; minimum, 0.0°C on many days during winter periods.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV												
19...	1045	2800	172	7.6	3.5	12.1	93	K2	K3	85	24	25
JAN												
12...	1420	718	212	7.2	.0	10.4	73	K1	27	110	35	31
MAR												
18...	1300	1000	178	7.6	.5	8.7	61	K1	K10	89	21	26
APR												
29...	1330	8910	66	6.5	8.0	9.6	81	K1	K8	32	9.0	9.0
JUN												
24...	1000	1020	166	7.4	16.5	9.2	95	K7	190	90	22	26
SEP												
23...	1140	2700	161	7.5	11.5	9.7	92	K18	39	85	16	25

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
NOV												
19...	5.5	1.4	3	.5	61	22	1.8	<.1	6.2	124	104	.17
JAN												
12...	7.0	1.9	4	.6	71	27	1.7	<.1	7.9	135	120	.18
MAR												
18...	5.8	1.6	4	.6	68	23	1.4	<.1	7.2	126	106	.17
APR												
29...	2.4	.8	5	.4	23	8.0	1.3	<.1	4.0	52	40	.07
JUN												
24...	6.2	1.5	3	.4	68	17	1.8	<.1	6.0	95	100	.13
SEP												
23...	5.4	1.3	--	<.1	69	19	1.7	<.1	6.5	124	100	.17

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982--CONTINUED

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV												
19...	937	.08	.010	.01	.23	.010	.03	.010	<.010	4	30	100
JAN												
12...	262	.11	.050	.05	.88	<.010	--	<.010	<.010	35	68	61
MAR												
18...	340	.22	.100	.13	.58	.030	.09	<.010	<.010	2	5.4	100
APR												
29...	1250	<.10	.030	.04	.70	.030	.09	<.010	<.010	9	217	100
JUN												
24...	262	<.10	.040	.05	.40	.020	.06	.020	.020	4	11	100
SEP												
23...	904	<.10	.020	.03	1.40	.020	.06	<.010	<.010	10	73	99

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
NOV										
19...	1045	1	1	<100	17	--	2	10	<10	<1
JAN										
12...	1420	1	<1	100	19	--	2	<10	<10	<1
APR										
29...	1330	2	1	<100	15	2	1	20	10	<1
JUN										
24...	1000	1	<1	<100	19	1	<1	10	<10	<1

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
NOV										
19...	<1	5	4	950	400	7	1	30	15	<.1
JAN										
12...	<1	8	2	640	310	<1	<1	--	24	<.1
APR										
29...	<1	5	3	790	390	320	6	30	18	.2
JUN										
24...	1	9	2	1000	560	<1	1	60	17	.2

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
NOV									
19...	<.1	2	<1	<1	<1	<1	<1	30	<4
JAN									
12...	<.1	4	<1	<1	<1	<1	<1	50	<4
APR									
29...	<.1	5	5	<1	<1	<1	<1	30	4
JUN									
24...	.2	6	<1	<1	<1	<1	<1	80	4

04057510 STURGEON RIVER NEAR NAHMA JUNCTION, MI

LOCATION.--Lat 45°56'35", long 86°42'20", in SW¼ SE¼ sec.17, T.41 N., R.19 W., Delta County, Hydrologic Unit 04030112, Hiawatha National Forest, on left bank 30 ft (9 m) upstream from bridge on Forest Service Road 2231, 500 ft (152 m) downstream from Mormon Creek, 0.1 mi (0.2 km) east of Federal Forest Highway 13, and 3.2 mi (5.1 km) north of Nahma Junction.

DRAINAGE AREA.--183 mi² (474 km²).

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Datum of gage is 610.99 ft (186.230 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--16 years, 207 ft³/s (5.862 m³/s), 15.36 in/yr (390 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,580 ft³/s (44.7 m³/s) Apr. 18, 1971, Apr. 30, 1972, gage height, 9.85 ft (3.002 m); minimum, 35 ft³/s (0.99 m³/s) Sept. 11, 12, 13, 14, 1976, gage height, 3.58 ft (1.091 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,320 ft³/s (37.4 m³/s) Apr. 26, 27; maximum gage height, 9.01 ft (2.746 m) Apr. 26; minimum discharge, 68 ft³/s (1.93 m³/s) Aug. 21, 22, gage height, 3.91 ft (1.192 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	100	194	148	86	90	90	240	754	114	61	101	111
2	165	180	153	84	90	90	270	672	109	81	105	126
3	164	167	157	82	90	90	290	604	105	79	129	142
4	151	158	152	82	90	90	320	539	101	81	225	131
5	150	155	144	82	90	90	350	485	97	79	200	142
6	167	235	137	84	90	90	375	461	94	79	162	243
7	223	260	140	88	90	90	350	457	93	80	140	238
8	210	239	138	90	92	90	330	425	92	76	126	208
9	185	213	130	90	92	90	320	390	89	73	115	175
10	162	190	119	88	94	90	310	381	94	74	109	152
11	148	175	115	88	96	92	300	378	92	276	101	137
12	134	162	110	86	96	105	352	350	88	526	95	126
13	124	153	105	86	96	130	396	403	88	449	91	122
14	125	146	100	88	94	140	435	448	96	426	87	277
15	191	141	95	88	94	145	518	396	150	424	86	409
16	215	136	88	90	92	150	628	352	154	626	83	377
17	213	132	84	90	90	150	743	323	138	893	79	341
18	570	128	82	90	90	155	711	301	125	743	75	360
19	693	125	80	92	90	155	738	269	114	523	73	315
20	568	122	78	92	90	150	724	244	110	379	71	293
21	475	119	78	94	90	150	641	218	120	299	70	271
22	405	116	78	94	90	150	672	196	140	248	83	246
23	348	109	78	94	90	155	741	179	136	214	109	222
24	305	105	78	94	90	155	910	165	125	183	105	225
25	278	100	78	94	90	160	1110	153	118	161	102	354
26	267	100	80	96	90	165	1280	141	108	143	103	363
27	257	110	80	96	90	175	1270	133	101	133	127	337
28	249	125	80	96	90	180	1100	128	95	123	130	302
29	238	135	80	94	---	190	959	127	92	111	120	266
30	222	140	82	92	---	200	842	122	87	107	121	239
31	207	---	84	90	---	220	---	117	---	106	113	---
TOTAL	7909	4570	3231	2780	2556	4172	18225	10311	3265	7878	3436	7250
MEAN	255	152	104	89.7	91.3	135	608	333	109	254	111	242
MAX	693	260	157	96	96	220	1280	754	154	893	225	409
MIN	100	100	78	82	90	90	240	117	87	73	70	111
CFSM	1.39	.83	.57	.49	.50	.74	3.32	1.82	.60	1.39	.61	1.32
IN.	1.61	.93	.66	.57	.52	.85	3.70	2.10	.66	1.60	.70	1.47

CAL YR 1981 TOTAL 66361 MEAN 182 MAX 954 MIN 61 CFSM 1.00 IN 13.49
WTR YR 1982 TOTAL 75583 MEAN 207 MAX 1280 MIN 70 CFSM 1.13 IN 15.36

04057800 MIDDLE BRANCH ESCANABA RIVER AT HUMBOLDT, MI

LOCATION.--Lat 46°29'57", long 87°53'11", in SW¼ sec.1, T.47 N., R.29 W., Marquette County, Hydrologic Unit 04030110, on left bank 15 ft (5 m) upstream from county highway, 1.5 mi (2.4 km) downstream from Halfway Creek, and 0.3 mi (0.5 km) north of Humboldt.

DRAINAGE AREA.--46.0 mi² (119.1 km²).

PERIOD OF RECORD.--June 1959 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. V-notch sharp-crested weir since Oct. 3, 1960. Datum of gage is 1,521.20 ft (463.662 m) Cleveland-Cliffs Iron Co. datum. Prior to Sept. 1, 1960, nonrecording gage at same site and datum.

REMARKS.--Records good, except those for the winter period and those for July, August and September, which are fair. From July 1960 to June 1972, some diversion 100 ft (30 m) upstream by industry for iron ore processing; figures of runoff adjusted. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 60.8 ft³/s (1.722 m³/s), 17.95 in/yr (456 mm/yr), adjusted for diversion 1960 to 1972.

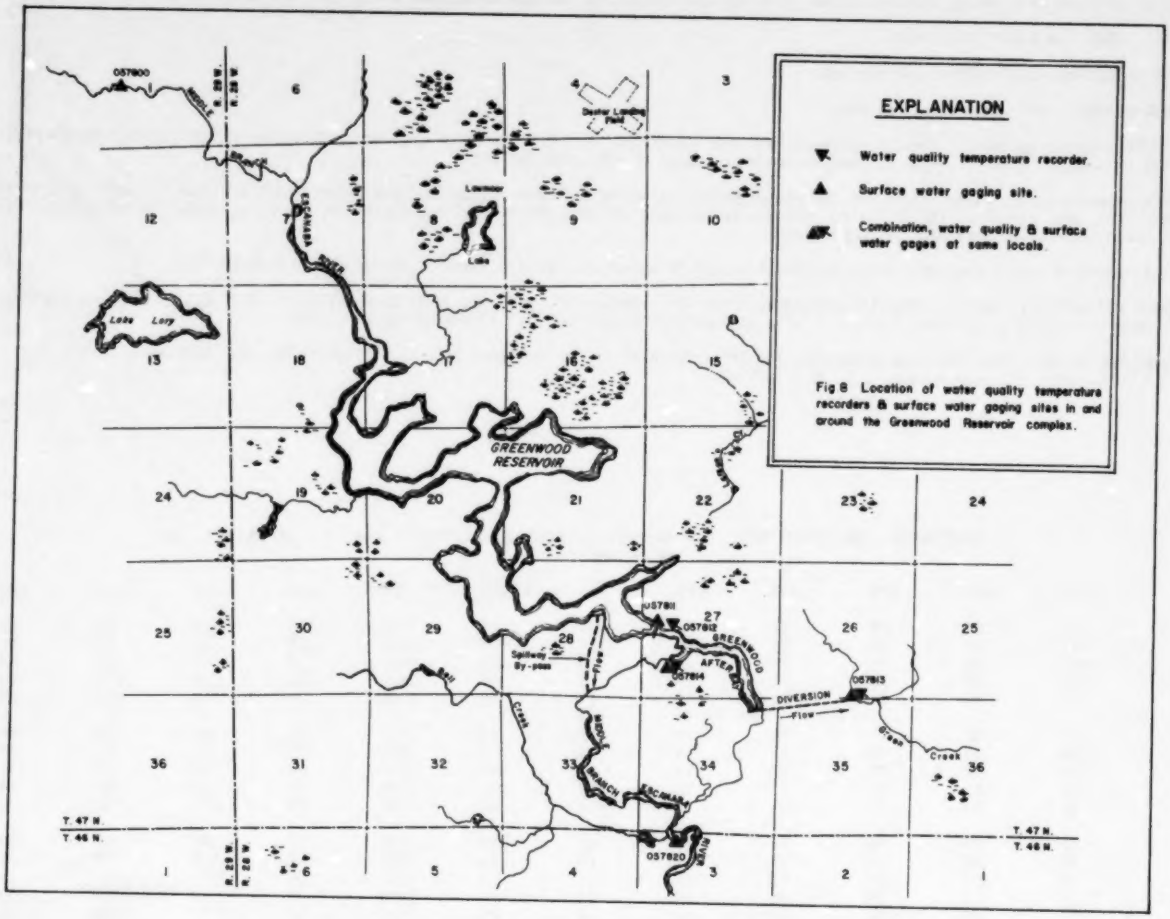
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,640 ft³/s (46.4 m³/s) Apr. 24, 1960, gage height, 8.30 ft (2.530 m), from floodmark; minimum, 4.0 ft³/s (0.11 m³/s) Sept. 12, 1976; minimum gage height, 1.07 ft (0.326 m) Aug. 24, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 762 ft³/s (21.6 m³/s) Apr. 26, gage height, 6.54 ft (1.993 m); minimum, 12 ft³/s (0.34 m³/s) Mar. 13, gage height, 1.71 ft (0.521 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	68	47	26	21	19	15	48	387	41	16	85	54
2	123	42	27	21	19	15	50	355	37	14	68	86
3	107	38	26	21	19	15	59	324	33	15	102	64
4	80	36	26	21	19	15	70	285	31	25	175	41
5	71	35	26	21	19	15	70	249	28	24	151	48
6	77	37	25	21	19	15	70	262	26	20	108	88
7	89	35	26	21	18	14	68	369	25	20	84	63
8	71	33	25	21	18	14	67	353	25	19	72	47
9	54	31	26	21	18	14	64	265	24	17	62	37
10	44	30	26	21	17	14	61	233	57	20	54	32
11	39	29	26	21	17	14	55	249	52	85	46	64
12	35	28	24	21	17	15	52	223	40	149	39	72
13	30	27	24	21	16	17	73	187	38	107	33	60
14	33	27	25	21	16	21	70	177	37	78	33	73
15	37	26	24	21	16	19	89	161	50	77	29	81
16	34	27	24	21	16	19	121	136	43	136	25	87
17	34	27	23	21	16	19	164	118	36	163	23	79
18	108	27	23	21	16	18	197	113	31	153	22	74
19	177	26	23	21	16	18	215	102	27	113	18	70
20	139	27	23	20	16	17	207	94	28	76	16	99
21	110	28	23	20	16	18	196	84	27	60	14	104
22	91	28	23	20	16	18	186	74	36	52	47	80
23	79	26	23	20	16	18	195	66	32	40	58	60
24	66	25	23	20	15	20	283	61	29	35	44	60
25	58	25	22	20	15	20	511	57	24	32	37	64
26	55	26	22	20	15	20	734	52	23	26	40	61
27	52	27	22	20	15	19	617	49	19	24	44	58
28	52	28	21	20	15	19	484	46	17	22	39	49
29	53	27	21	20	---	20	413	45	18	21	41	43
30	51	26	21	20	---	25	402	42	17	81	37	62
31	48	---	21	20	---	40	---	41	---	112	28	---
TOTAL	2165	901	740	639	470	560	5891	5259	951	1832	1674	1960
MEAN	69.8	30.0	23.9	20.6	16.8	18.1	196	170	31.7	59.1	54.0	65.3
MAX	177	47	27	21	19	40	734	387	57	163	175	104
MIN	30	25	21	20	15	14	48	41	17	14	14	32
CFSM	1.52	.65	.52	.45	.37	.39	4.26	3.70	.69	1.29	1.17	1.42
IN.	1.75	.73	.60	.52	.38	.45	4.76	4.25	.77	1.48	1.35	1.59

CAL YR 1981 TOTAL 21092 MEAN 57.8 MAX 364 MIN 12 CFSM 1.26 IN 17.06
WTR YR 1982 TOTAL 23042 MEAN 63.1 MAX 734 MIN 14 CFSM 1.37 IN 18.63



Greenwood Reservoir is formed by an earth/rockfill main dam (Greenwood Dam) and several earthfill dikes surrounding the storage area. Storage began Dec. 22, 1972, and the fixed-crest concrete spillway was completed in September 1973. The usable capacity of the reservoir is 23,300 acre-ft (28.7 hm^3) at a spillway elevation of 1515 ft (461.8 m). At pool elevation exceeding 1515 ft (461.8 m), water flows over the spillway into the Middle Branch Escanaba River below Greenwood Release (04057814). At lower pool elevations, outflow from Greenwood Reservoir into Greenwood Afterbay is completely regulated by the multiport outlet of Greenwood Dam. Greenwood Afterbay has two outlets; one for diversion by pipeline into Green Creek and the second for releasing flows to Middle Branch Escanaba River. Water temperatures are measured directly below Greenwood Dam (Greenwood Afterbay, 04057812), the gaging station at the diversion (Greenwood Diversion, 04057813), and the gaging station below the release from the afterbay to Middle Branch Escanaba River (Greenwood Release, 04057814).

04057811 GREENWOOD RESERVOIR NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'32", long 87°48'02", in NW¼ SW¼ sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, at downstream side of dam, on Middle Branch Escanaba River, 3.7 mi (6.0 km) southwest of Greenwood.

DRAINAGE AREA.--67.4 mi² (174.6 km²).

PERIOD OF RECORD.--December 1972 to current year (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is 1,400.00 ft (246.720 m) National Geodetic Vertical Datum of 1929 (levels by Cleveland-Cliffs Iron Co.); gage readings have been reduced to elevations NGVD. Prior to Feb. 20, 1973, nonrecording gage at same site and datum.

REMARKS.--The reservoir is formed by an earth/rockfill main dam and several earthfill dykes surrounding the storage area. Storage began Dec. 22, 1972. The fixed-crest concrete spillway was completed in September 1973. The usable capacity of the reservoir is 23,300 acre-ft (28.7 hm³) at spillway elevation 1,515 ft (461.8 m). Above elevation of 1,515 ft (461.8 m), water flows over concrete spillway into Middle Branch Escanaba River about 2,000 ft (610 m) below Greenwood Release (station 04057814). The main dam is equipped with an outlet structure with 4 valves to control flow to afterbay (conservation pool) which has a capacity of 420 acre-ft (518,000 m³) at elevation 1,480 ft (451.1 m). Two outlet systems from the afterbay provide for diversion and release flow. Diverted flow to Green Creek gaged at Greenwood Diversion (station 04057813); released flow to Middle Branch Escanaba River gaged at Greenwood Release (station 04057814). Reservoir impounds water for diversion to Schweitzer Reservoir (station 04058190), for use in iron ore processing.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 25,400 acre-ft (31.3 hm³) Apr. 26, 27, 1979, elevation, 1,516.5 ft (462.23 m); minimum since first filling, 3,240 acre-ft (3.99 hm³) Mar. 12, 1977, elevation, 1,491.1 ft (454.49 m).

EXTREMES FOR CURRENT YEAR.--Maximum contents, 24,840 acre-ft (30.6 hm³) Apr. 27, elevation, 1,516.1 ft (462.11 m); minimum, 17,220 acre-ft (21.2 hm³) Mar. 30, elevation, 1,510.1 ft (460.28 m).

MONTHEND ELEVATION, IN FEET NGVD, AND CONTENTS AT 2400, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)	Change in contents (equivalent in ft³/s)
Sept. 30	1511.6	19020	--	--
Oct. 31	1513.9	21870	+2850	+46.4
Nov. 30	1514.1	22130	+260	+4.4
Dec. 31	1513.9	21870	-260	-4.2
CAL YR 1981	--	--	-1170	-1.6
Jan. 31	1513.1	20830	-1040	-16.9
Feb. 28	1511.5	18900	-1930	-34.8
Mar. 31	1510.1	17220	-1680	-27.3
Apr. 30	1516.1	24840	+7620	+128
May 31	1515.1	23440	-1400	-22.8
June 30	1514.9	23170	-270	-4.5
July 31	1515.2	23580	+410	+6.7
Aug. 31	1515.1	23440	-140	-2.3
Sept. 30	1515.2	23580	+140	+2.4
WTR YR 1982	--	--	+4560	+6.3

STREAMS TRIBUTARY TO LAKE MICHIGAN

04057812 GREENWOOD AFTERBAY NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'32", long 87°48'02", in NW¼ SW¼ sec.27, T.47 N., R.28W., Marquette County, Hydrologic Unit 04030110, in control house on downstream side of Greenwood Dam on the Middle Branch Escanaba River, 3.5 mi (5.6 km) southwest of Greenwood.

DRAINAGE AREA.--67.4 mi² (174.6 km²).

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: January 1973 to current year.

INSTRUMENTATION.--Temperature recorder since Jan. 31, 1973.

REMARKS.--Flow regulated by the multi-port outlets of Greenwood Reservoir. Altitude of outlets are: (No. 1) 1,505 ft (458.7 m), (No. 2) 1,495 ft (455.7 m), (No. 3) 1,485 ft (452.6 m), (No. 4) 1,478 ft (450.5 m) above mean sea level. Outlet No. 3 was open Oct. 1 to Sept. 30.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 24.5°C July 14, 15, 1974; minimum, 0.0°C on many days during January to March 1973.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 15.5°C Aug. 27; minimum, 1.5°C Mar. 12 to Apr. 20, Apr. 23-26.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	OCTOBER MAX	OCTOBER MIN	NOVEMBER MAX	NOVEMBER MIN	DECEMBER MAX	DECEMBER MIN	JANUARY MAX	JANUARY MIN	FEBRUARY MAX	FEBRUARY MIN	MARCH MAX	MARCH MIN
1	12.5	11.5	8.0	8.0	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0
2	11.5	11.5	8.0	8.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
3	11.5	11.0	8.0	8.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
4	11.0	11.0	8.0	8.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
5	11.0	11.0	8.0	8.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
6	11.5	11.5	8.0	8.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
7	11.5	11.5	8.0	8.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
8	11.5	11.0	8.0	7.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
9	11.0	11.0	7.0	6.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0
10	11.0	11.0	7.0	6.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
11	11.0	10.5	6.5	6.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
12	10.5	10.5	6.5	6.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
13	10.5	10.5	6.5	6.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5
14	10.5	10.5	6.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
15	10.5	10.5	6.0	6.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
16	10.5	10.5	6.0	5.5	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
17	11.0	11.0	5.5	5.5	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
18	11.0	10.5	5.5	5.5	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
19	10.5	10.0	5.5	5.5	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
20	10.0	10.0	5.5	5.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
21	10.0	9.5	5.0	4.5	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
22	9.5	9.5	4.5	4.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
23	9.5	9.0	4.0	4.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
24	9.0	8.5	4.0	3.5	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
25	8.5	8.0	3.5	3.5	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
26	8.0	8.0	3.5	3.5	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
27	8.0	8.0	3.5	3.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
28	8.0	8.0	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
29	8.0	7.5	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5
30	8.0	8.0	3.0	3.0	2.0	2.0	2.0	2.0	---	---	1.5	1.5
31	8.0	8.0	---	---	2.0	2.0	2.0	2.0	---	---	1.5	1.5
MONTH	12.5	7.5	8.0	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5

04057812 GREENWOOD AFTERBAY NEAR GREENWOOD, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	1.5	1.5	3.5	2.5	8.0	8.0	12.0	11.5	13.5	13.5	15.0	15.0
2	1.5	1.5	4.0	3.5	8.5	8.0	12.0	12.0	13.5	13.5	15.5	15.0
3	1.5	1.5	5.0	4.0	9.0	8.5	12.5	12.0	13.5	13.5	15.5	15.0
4	1.5	1.5	5.0	5.0	9.0	8.0	12.0	12.0	13.5	13.5	15.0	15.0
5	1.5	1.5	5.5	5.0	9.5	8.0	12.5	12.0	13.5	13.5	15.0	15.0
6	1.5	1.5	6.0	5.5	10.0	9.0	12.5	12.0	14.0	13.5	15.0	14.5
7	1.5	1.5	6.5	6.0	9.5	9.0	12.5	12.0	14.0	13.5	14.5	14.5
8	1.5	1.5	6.5	6.0	10.0	9.0	12.5	12.0	14.0	13.5	14.5	14.5
9	1.5	1.5	7.0	6.5	10.0	9.5	12.5	12.5	14.5	13.5	14.5	14.5
10	1.5	1.5	7.0	7.0	10.0	9.5	12.5	12.5	14.5	14.0	14.5	14.5
11	1.5	1.5	7.5	7.0	10.0	10.0	13.0	12.5	14.5	14.5	14.5	14.0
12	1.5	1.5	7.5	7.5	10.0	9.5	13.0	12.5	14.5	14.0	14.0	14.0
13	1.5	1.5	7.5	7.5	10.0	9.5	13.0	12.5	14.5	14.0	14.0	14.0
14	1.5	1.5	7.5	7.5	10.0	10.0	13.0	12.5	14.5	14.5	14.0	14.0
15	1.5	1.5	7.5	7.5	10.0	10.0	13.0	12.5	14.5	14.5	14.0	14.0
16	1.5	1.5	8.0	7.5	10.5	10.0	13.0	12.5	14.0	13.5	14.5	14.0
17	1.5	1.5	7.5	7.0	10.5	10.0	13.0	12.5	14.0	14.0	14.5	14.5
18	1.5	1.5	7.0	6.5	10.5	10.0	13.0	13.0	14.0	14.0	15.0	14.0
19	1.5	1.5	7.0	6.5	11.0	10.5	13.0	13.0	14.5	13.5	14.0	14.0
20	2.0	1.5	7.5	7.5	11.0	10.5	13.5	13.0	14.5	13.5	14.0	14.0
21	2.0	2.0	7.5	7.0	11.0	11.0	13.0	13.0	14.5	14.0	14.0	14.0
22	2.0	2.0	8.0	7.0	11.0	11.0	13.5	13.0	14.5	14.0	14.0	13.5
23	2.0	1.5	7.5	7.0	11.0	11.0	13.5	13.0	14.5	14.0	13.5	13.5
24	1.5	1.5	7.5	7.0	11.5	10.5	13.5	13.5	14.0	14.0	13.5	13.5
25	1.5	1.5	7.5	7.0	11.5	11.0	13.5	13.5	14.5	14.0	13.5	13.0
26	2.0	1.5	7.5	7.0	11.5	11.0	13.5	13.5	14.0	14.0	13.0	13.0
27	2.0	2.0	7.5	7.0	12.0	11.5	13.5	13.5	15.5	14.0	13.0	13.0
28	2.5	2.5	8.0	7.5	12.0	11.0	13.5	13.5	15.0	14.5	13.0	13.0
29	2.5	2.5	8.0	8.0	12.0	12.0	13.5	13.5	15.0	15.0	13.0	13.0
30	2.5	2.5	8.0	8.0	12.5	12.0	13.5	13.5	15.0	15.0	13.0	13.0
31	---	---	8.0	8.0	---	---	13.5	13.5	15.0	15.0	---	---
MONTH	2.5	1.5	8.0	2.5	12.5	8.0	13.5	11.5	15.5	13.5	15.5	13.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

04057813 GREENWOOD DIVERSION NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'04", long 87°46'10", in NW¼ NE¼ sec.35, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on left bank at downstream end of pipeline, 200 ft (61 m) upstream from Green Creek, 0.7 mi (1.1 km) downstream from Greenwood Afterbay, and 3.6 mi (5.8 km) south of Greenwood.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--December 1972 to current year.

GAGE.--Water-stage recorder and concrete flume. Altitude of gage is 1,460 ft (445 m) from topographic map (nearest 10 ft). Prior to Aug. 22, 1973, nonrecording gage at same and datum.

REMARKS.--Water-discharge records excellent. Flow completely regulated. A pipeline, 0.7 mi (1.1 km) long, diverts water from Greenwood Reservoir (station 04057811) into Green Creek, tributary to Schweitzer Reservoir (station 04058190). Water is used for iron ore processing; some returned to Middle Branch Escanaba River 27 mi (43 km) downstream via another Green Creek (station 04058130); some returned 31 mi (50 km) downstream via Goose Lake Outlet (station 04058400) and East Branch Escanaba River.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 30 ft³/s (0.85 m³/s) June 25-28, 1977, Nov. 9, 1979; no flow Dec. 27, 1972 to Jan. 6, 1973; minimum daily discharge since diversion began, 0.02 ft³/s (0.001 m³/s) Nov. 3-22, 1977.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20	4.4	11	11	26	26	23	1.5	1.5	1.6	1.7	1.5
2	20	6.0	11	10	25	26	22	1.5	1.5	1.6	1.7	1.5
3	20	7.3	11	11	25	26	23	1.5	1.6	1.5	1.7	1.5
4	20	7.3	11	10	25	26	23	1.5	1.7	1.5	1.7	1.5
5	20	7.3	11	11	25	26	20	1.5	1.7	1.5	1.7	1.5
6	20	7.2	11	13	25	26	17	1.5	1.7	1.5	1.7	1.5
7	20	7.2	11	13	26	26	17	1.5	1.7	1.5	1.7	1.5
8	20	7.2	11	15	26	26	17	1.5	1.6	1.5	1.7	1.5
9	20	7.2	11	18	26	26	17	1.5	1.5	1.5	1.7	1.5
10	20	7.2	11	18	26	26	17	1.5	1.5	1.5	1.7	1.5
11	20	7.2	11	19	26	26	17	1.5	1.5	1.6	1.7	1.5
12	20	7.2	10	20	26	26	12	1.5	1.5	1.6	1.7	1.5
13	20	7.2	10	21	26	26	4.1	1.5	1.5	1.6	1.7	1.5
14	17	7.2	10	22	26	26	1.5	1.5	1.5	1.7	1.7	1.5
15	15	7.2	10	23	26	26	1.5	1.5	1.5	1.7	1.6	1.5
16	13	7.2	10	27	26	26	1.5	1.5	1.5	1.7	1.6	1.5
17	10	7.2	10	27	26	26	1.5	1.5	1.5	1.7	1.6	1.5
18	10	7.2	10	27	26	26	1.5	1.5	1.5	1.7	1.6	1.5
19	8.0	7.2	10	27	26	26	1.5	1.5	1.5	1.7	1.6	1.5
20	4.4	7.3	10	27	26	26	1.5	1.5	1.5	1.7	1.6	1.5
21	4.4	7.2	10	27	26	26	1.5	1.5	1.5	1.7	1.6	1.5
22	4.4	7.2	10	27	26	26	1.5	1.5	1.5	1.7	1.6	1.5
23	4.4	9.0	10	27	26	26	1.5	1.5	1.5	1.7	1.6	1.5
24	4.4	11	10	27	26	26	1.5	1.5	1.5	1.7	1.6	1.5
25	4.4	11	10	27	26	26	1.5	1.5	1.5	1.7	1.6	1.5
26	4.4	11	10	27	26	26	1.6	1.5	1.5	1.7	1.6	1.5
27	4.4	11	10	27	26	26	1.6	1.5	1.5	1.7	1.6	1.5
28	4.4	11	10	26	26	26	1.6	1.5	1.5	1.7	1.6	1.5
29	4.4	11	10	26	---	26	1.5	1.5	1.5	1.7	1.6	1.5
30	4.4	11	10	26	---	24	1.5	1.5	1.6	1.7	1.6	1.6
31	4.4	---	10	26	---	23	---	1.5	---	1.7	1.5	---
TOTAL	385.8	240.8	321	663	723	801	255.0	46.5	46.1	50.6	50.9	45.1
MEAN	12.4	8.03	10.4	21.4	25.8	25.8	8.50	1.50	1.54	1.63	1.64	1.50
MAX	20	11	11	27	26	26	23	1.5	1.7	1.7	1.7	1.6
MIN	4.4	4.4	10	10	25	23	1.5	1.5	1.5	1.5	1.5	1.5

CAL YR 1981 TOTAL 5962.3 MEAN 16.3 MAX 27 MIN 4.4
WTR YR 1982 TOTAL 3628.8 MEAN 9.94 MAX 27 MIN 1.5

04057813 GREENWOOD DIVERSION NEAR GREENWOOD, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: September 1973 to September 1982 (discontinued).

INSTRUMENTATION.--Temperature recorder since Aug. 31, 1973.

REMARKS.--Flow regulated by inlet structure of pipeline from Greenwood Afterbay 0.7 mi (1.1 km) upstream.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 22.5°C July 18, 19, 1974; minimum, 0.5°C on many days during winter periods 1977, 1978.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 15.0°C Aug. 27 to Sept. 1; minimum, 1.5°C Feb. 15-23, Mar. 10-19.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	11.0	10.5	5.5	5.5	3.0	3.0	2.5	2.5	2.0	2.0	2.0	2.0
2	10.5	10.0	6.0	5.5	3.0	3.0	2.5	2.5	2.0	2.0	2.0	2.0
3	10.0	9.0	6.0	6.0	3.0	3.0	2.5	2.5	2.0	2.0	2.0	2.0
4	9.0	9.0	6.0	6.0	3.0	2.5	2.5	2.5	2.0	2.0	2.0	2.0
5	9.5	9.0	6.5	6.0	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0
6	10.0	9.5	6.5	6.0	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0
7	10.0	9.5	6.0	6.0	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0
8	9.5	9.5	6.0	5.5	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0
9	9.5	9.5	5.5	5.0	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0
10	9.5	9.5	5.0	5.0	2.5	2.5	2.5	2.5	2.0	2.0	2.0	1.5
11	9.5	9.5	5.0	4.5	2.5	2.5	2.5	2.0	2.0	2.0	1.5	1.5
12	9.5	9.5	4.5	4.5	2.5	2.5	2.0	2.0	2.0	2.0	1.5	1.5
13	9.5	9.5	4.5	4.5	2.5	2.5	2.0	2.0	2.0	2.0	1.5	1.5
14	10.0	9.5	4.5	4.0	2.5	2.5	2.0	2.0	2.0	2.0	1.5	1.5
15	10.0	10.0	4.0	4.0	2.5	2.5	2.0	2.0	2.0	1.5	1.5	1.5
16	10.0	10.0	4.0	4.0	2.5	2.5	2.0	2.0	1.5	1.5	1.5	1.5
17	10.0	10.0	4.5	4.0	2.5	2.5	2.0	2.0	1.5	1.5	1.5	1.5
18	10.0	9.0	4.5	4.5	2.5	2.5	2.0	2.0	1.5	1.5	1.5	1.5
19	9.0	8.5	4.5	4.0	2.5	2.5	2.0	2.0	1.5	1.5	2.0	1.5
20	8.5	8.0	4.0	3.0	2.5	2.5	2.0	2.0	1.5	1.5	2.0	2.0
21	8.0	7.5	3.0	2.5	2.5	2.5	2.0	2.0	1.5	1.5	2.0	2.0
22	7.5	7.0	2.5	2.0	2.5	2.5	2.0	2.0	1.5	1.5	2.0	2.0
23	7.0	6.5	2.5	2.0	2.5	2.5	2.0	2.0	2.0	1.5	2.0	2.0
24	6.5	6.0	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0
25	6.0	5.5	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0
26	5.5	5.0	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0
27	5.0	5.0	3.0	2.5	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0
28	5.0	5.0	3.0	3.0	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0
29	5.0	5.0	3.0	3.0	2.5	2.5	2.0	2.0	---	---	2.0	2.0
30	5.0	5.0	3.0	3.0	2.5	2.5	2.0	2.0	---	---	2.0	2.0
31	5.5	5.0	---	---	2.5	2.5	2.0	2.0	---	---	2.0	2.0
MONTH	11.0	5.0	6.5	2.0	3.0	2.5	2.5	2.0	2.0	1.5	2.0	1.5

04057813 GREENWOOD DIVERSION NEAR GREENWOOD, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	2.0	2.0	3.0	3.0	9.0	9.0	12.5	12.5	14.5	14.5	15.0	14.5
2	2.0	2.0	3.0	3.0	9.5	9.0	12.5	12.5	14.5	14.5	14.5	14.5
3	2.0	2.0	3.5	3.0	9.5	9.5	13.0	12.5	14.5	14.5	14.5	14.5
4	2.0	2.0	4.0	4.0	9.5	9.5	13.0	13.0	14.5	14.5	14.5	14.5
5	2.0	2.0	4.0	4.0	9.5	9.5	13.0	13.0	14.5	14.5	14.5	14.5
6	2.0	2.0	4.5	4.0	10.0	9.5	13.0	13.0	14.5	14.5	14.5	14.5
7	2.0	2.0	4.5	4.5	10.0	10.0	13.5	13.0	14.5	14.5	14.5	14.0
8	2.0	2.0	5.0	4.5	10.0	9.5	13.5	13.5	14.5	14.5	14.0	14.0
9	2.0	2.0	5.0	5.0	10.0	9.5	13.5	13.5	14.5	14.5	14.0	14.0
10	2.5	2.0	5.0	5.0	10.0	10.0	14.5	13.5	14.5	14.5	14.0	14.0
11	2.5	2.5	5.0	5.0	10.5	10.0	14.5	14.0	14.5	14.5	14.0	14.0
12	2.5	2.5	5.5	5.0	10.5	9.5	14.0	14.0	14.5	14.5	14.0	14.0
13	2.5	2.5	5.5	5.5	10.5	10.0	14.0	14.0	14.5	14.5	14.0	14.0
14	2.5	2.5	6.0	5.5	10.5	10.5	14.0	13.5	14.5	14.5	14.0	14.0
15	2.5	2.5	6.0	6.0	10.5	10.5	14.0	13.5	14.5	14.5	14.0	14.0
16	2.5	2.5	6.5	6.0	10.5	10.5	14.0	14.0	14.5	14.5	14.0	14.0
17	2.5	2.5	6.5	6.5	10.5	10.5	14.0	14.0	14.5	14.5	14.0	14.0
18	2.5	2.5	7.0	6.5	11.0	10.5	14.0	14.0	14.5	14.5	14.0	13.5
19	3.0	2.5	7.0	7.0	11.5	11.0	14.0	14.0	14.5	14.5	13.5	13.0
20	3.0	3.0	7.5	7.0	11.5	11.5	14.0	14.0	14.5	14.5	13.5	13.0
21	3.0	3.0	7.5	7.5	11.5	11.5	14.0	14.0	14.5	14.5	13.0	12.0
22	3.0	3.0	7.5	7.0	11.5	11.5	14.0	14.0	14.5	14.5	12.0	12.0
23	3.0	2.5	8.0	7.0	12.0	11.5	14.0	14.0	14.5	14.5	12.0	12.0
24	2.5	2.5	8.0	8.0	12.0	12.0	14.0	14.0	14.5	14.5	12.0	12.0
25	2.5	2.5	8.0	8.0	12.0	12.0	14.0	14.0	14.5	14.5	12.0	11.5
26	3.0	2.5	8.5	8.0	12.5	12.0	14.0	14.0	14.5	14.5	11.5	11.5
27	3.0	3.0	8.5	8.5	12.5	12.5	14.0	14.0	15.0	14.5	11.5	11.5
28	3.0	3.0	8.5	8.5	12.5	12.5	14.5	14.0	15.0	15.0	11.5	11.5
29	3.0	3.0	8.5	8.5	12.5	12.5	14.5	14.5	15.0	15.0	11.5	11.5
30	3.0	3.0	9.0	8.5	12.5	12.5	14.5	14.5	15.0	15.0	11.5	11.5
31	---	---	9.0	9.0	---	---	14.5	14.5	15.0	15.0	---	---
MONTH	3.0	2.0	9.0	3.0	12.5	9.0	14.5	12.5	15.0	14.5	15.0	11.5

04057814 GREENWOOD RELEASE NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'22", long 87°47'52", in NW¼ SW¼ sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on left bank at outlet of Greenwood Afterbay releasing to Middle Branch Escanaba River, 2.6 mi (4.2 km) upstream from Bell Creek and 3.8 mi (6.1 km) southwest of Greenwood.

DRAINAGE AREA.--67.4 mi² (174.6 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1972 to current year.

GAGE.--Water-stage recorder and concrete flume. Altitude of gage is 1,480 ft (451 m) from topographic map (nearest 10 ft). Prior to Nov. 7, 1973, nonrecording gage at same site and different datum.

REMARKS.--Water-discharge records excellent. Since December 1972, flow from Greenwood Reservoir (station 04057811) below spillway elevation 1,515 ft (462 m) is completely regulated by the afterbay release structure into the Middle Branch Escanaba River. Since January 1973, water diverted immediately above this station via Greenwood Diversion (station 04057813) to Green Creek for iron ore processing and some returned to Middle Branch Escanaba River 27 mi (43 km) downstream via another Green Creek (station 04058130). Since October 1979, some of the diversion returned 31 mi (50 km) downstream via Goose Lake Outlet (station 04058400) and East Branch Escanaba River. Overflow from the reservoir spillway bypasses and returns to the Middle Branch Escanaba River 0.5 mi (0.8 km) downstream from this station.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge (prior to regulation), 290 ft³/s (8.21 m³/s) Oct. 1, 1972; (since regulation began), 63 ft³/s (1.78 m³/s) July 10, 11, 1974; minimum daily, 10 ft³/s (0.28 m³/s) Dec. 29, 30, 1972, result of construction.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	27	26	25	25	25	25	26	24	25	26	29	29
2	27	26	25	25	24	25	26	24	25	27	29	29
3	27	26	25	25	24	25	26	25	27	27	30	29
4	27	25	25	25	24	25	26	26	30	27	30	29
5	27	25	25	25	24	25	26	25	32	27	30	29
6	27	25	25	25	25	25	26	25	32	27	29	29
7	27	25	25	25	25	25	25	26	32	27	29	29
8	27	24	25	25	25	25	25	25	29	27	29	29
9	27	25	25	26	26	25	25	25	27	27	29	29
10	26	25	25	26	26	25	25	25	26	27	29	29
11	26	25	25	26	26	25	25	26	25	29	29	29
12	26	25	25	26	26	25	25	26	25	29	29	29
13	26	25	25	26	26	25	25	26	24	29	29	28
14	25	25	25	26	26	25	25	26	24	29	29	28
15	25	25	25	26	26	25	25	26	24	29	29	28
16	25	25	25	27	26	25	25	26	25	29	29	28
17	25	25	25	27	26	25	25	26	25	29	29	28
18	26	25	25	27	26	26	25	26	25	29	29	28
19	26	25	25	27	26	26	25	26	25	29	29	28
20	26	25	25	27	26	26	25	26	26	29	29	28
21	26	25	25	27	26	26	25	26	26	29	29	29
22	26	25	25	26	26	26	25	26	26	29	29	29
23	26	25	25	26	26	26	25	25	26	29	29	29
24	26	25	25	26	26	26	26	25	26	28	29	28
25	26	25	25	26	25	26	27	25	26	28	29	28
26	26	25	25	26	25	26	27	25	26	28	29	28
27	26	25	25	26	25	26	26	25	26	29	29	28
28	26	25	25	26	25	26	25	25	26	29	29	28
29	26	25	25	25	---	26	25	25	26	29	29	27
30	26	25	25	25	---	26	24	25	26	29	29	28
31	26	---	25	25	---	27	---	25	---	29	29	---
TOTAL	811	752	775	801	712	790	761	787	793	875	902	854
MEAN	26.2	25.1	25.0	25.8	25.4	25.5	25.4	25.4	26.4	28.2	29.1	28.5
MAX	27	26	25	27	26	27	27	26	32	29	30	29
MIN	25	24	25	25	24	25	24	24	24	26	29	27

CAL YR 1981 TOTAL 9400 MEAN 25.8 MAX 29 MIN 24
WTR YR 1982 TOTAL 9613 MEAN 26.3 MAX 32 MIN 24

04057814 GREENWOOD RELEASE NEAR GREENWOOD, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: September 1973 to September 1982 (discontinued).

INSTRUMENTATION.--Temperature recorder since Sept. 1, 1973.

REMARKS.--No temperature record Dec. 29 to Jan. 5. Flow regulated by valve at outlet of Greenwood Afterbay.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 23.5°C July 14, 15, 1974; minimum, 0.0°C Mar. 24, 25, 1979.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 19.0°C Aug. 16; minimum, 0.5°C Apr. 4.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	12.0	10.5	7.5	6.5	2.5	2.5	---	---	2.0	2.0	2.5	2.5
2	11.5	10.5	7.0	6.5	2.5	2.5	---	---	2.0	2.0	2.5	2.5
3	11.5	10.5	7.0	6.5	2.5	2.5	---	---	2.0	2.0	2.5	2.5
4	11.5	11.0	7.0	6.5	2.5	2.5	---	---	2.0	2.0	2.5	2.5
5	11.0	11.0	7.0	7.0	2.5	2.5	---	---	2.5	2.0	2.5	2.5
6	11.0	10.5	7.0	6.0	2.5	2.5	2.0	2.0	2.5	2.5	2.5	2.5
7	10.5	10.0	6.0	6.0	2.5	2.5	2.0	2.0	2.5	2.5	2.5	2.5
8	11.0	10.0	6.0	6.0	2.5	2.0	2.0	2.0	2.5	2.5	2.5	2.5
9	10.5	10.0	6.0	5.5	2.0	2.0	2.0	2.0	2.5	2.5	2.5	2.5
10	10.0	10.0	5.5	5.5	2.5	2.0	2.0	1.5	2.5	2.5	2.5	2.0
11	10.0	10.0	5.5	5.5	2.5	2.5	1.5	1.5	2.5	2.5	2.0	2.0
12	10.0	10.0	5.5	5.0	2.5	2.5	1.5	1.5	2.5	2.5	2.0	2.0
13	10.0	10.0	5.5	5.0	2.5	2.5	1.5	1.5	2.5	2.5	2.0	1.5
14	10.0	10.0	5.5	5.0	2.5	2.5	1.5	1.5	2.5	2.5	2.5	1.5
15	10.0	10.0	5.5	5.5	2.5	2.5	1.5	1.5	2.5	2.5	2.5	2.0
16	10.0	10.0	5.5	5.5	2.5	2.5	1.5	1.5	2.5	2.5	2.5	2.0
17	10.0	10.0	5.5	5.5	2.5	2.5	2.0	1.5	2.5	2.0	2.5	2.0
18	10.0	8.0	5.5	5.0	2.5	2.5	2.0	2.0	2.0	2.0	2.5	2.5
19	8.0	8.0	5.0	4.5	2.5	2.5	2.0	2.0	2.0	2.0	2.5	2.5
20	8.5	8.0	4.5	3.5	2.5	2.5	2.0	2.0	2.0	2.0	2.5	2.5
21	8.0	8.0	3.5	3.0	2.5	2.5	2.0	2.0	2.0	2.0	2.5	2.5
22	8.0	7.5	3.5	3.0	2.5	2.5	2.0	2.0	2.0	2.0	3.0	2.5
23	8.0	7.0	3.5	3.5	2.5	2.5	2.0	2.0	2.0	2.0	3.0	2.5
24	7.0	6.5	3.5	3.0	2.5	2.5	2.0	2.0	2.0	2.0	3.0	2.5
25	6.5	6.0	3.0	3.0	2.5	2.5	2.0	2.0	2.0	2.0	3.0	2.5
26	6.5	6.5	3.0	3.0	2.5	2.5	2.0	2.0	2.0	2.0	2.5	2.5
27	7.0	6.5	3.0	2.5	2.5	2.5	2.0	2.0	2.0	2.0	3.0	2.5
28	7.0	6.5	2.5	2.0	2.5	2.5	2.0	2.0	2.0	2.0	3.0	2.5
29	6.5	6.5	2.5	2.0	---	---	2.0	2.0	---	---	3.0	2.0
30	7.0	6.5	2.5	2.5	---	---	2.0	2.0	---	---	3.0	2.0
31	7.5	7.0	---	---	---	---	2.0	2.0	---	---	2.5	2.0
MONTH	12.0	6.0	7.5	2.0					2.5	2.0	3.0	1.5

04057814 GREENWOOD RELEASE NEAR GREENWOOD, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	2.5	1.5	8.0	5.0	11.0	9.0	15.5	12.0	16.0	14.5	16.5	14.0
2	2.5	2.0	8.5	5.0	12.0	9.0	15.5	12.5	15.5	13.5	15.5	14.5
3	2.0	1.0	7.5	5.0	12.0	9.0	14.0	13.0	16.5	14.5	14.5	14.0
4	1.5	.5	7.5	5.5	13.0	10.0	13.5	12.5	17.0	15.0	16.0	14.0
5	2.0	1.5	8.5	7.0	12.5	11.0	14.0	12.5	15.5	15.0	16.0	13.5
6	2.0	2.0	8.5	6.5	12.5	11.0	17.0	13.5	17.0	15.0	15.0	12.5
7	2.5	2.0	8.0	6.0	16.5	11.5	16.5	13.5	18.0	15.5	15.0	14.0
8	2.5	2.0	9.0	6.0	15.0	12.5	16.0	13.0	16.5	15.0	16.5	14.5
9	2.5	2.0	7.5	7.0	12.5	11.5	15.5	13.5	15.5	13.5	17.0	15.0
10	2.5	2.0	8.5	7.0	12.5	11.5	16.5	13.5	15.5	13.0	16.5	15.0
11	2.0	2.0	12.5	8.0	13.5	10.0	15.5	13.0	16.5	13.0	16.0	15.5
12	2.0	2.0	11.5	9.0	14.5	11.5	16.0	13.0	16.0	13.5	16.5	15.5
13	2.5	2.0	9.5	8.5	13.5	11.0	15.5	13.5	16.0	14.0	16.5	15.5
14	3.0	2.5	12.0	9.5	14.0	11.0	17.5	14.5	15.5	14.5	16.5	13.5
15	3.0	3.0	13.0	10.0	12.5	11.0	16.0	14.5	17.5	15.0	13.5	13.0
16	3.0	2.5	13.0	11.0	14.0	10.0	16.0	15.5	19.0	15.5	14.5	12.5
17	2.5	2.0	12.5	10.0	13.0	11.5	17.0	14.5	17.5	15.0	14.0	13.5
18	3.0	1.5	13.5	10.0	12.0	10.5	18.0	15.0	17.0	15.0	15.0	13.5
19	3.0	2.0	13.0	10.0	13.0	11.0	16.5	13.5	18.5	15.5	15.0	14.0
20	2.0	1.5	11.5	8.5	12.0	11.0	16.0	14.5	17.0	15.5	14.0	13.5
21	3.0	2.0	11.0	7.5	13.5	11.0	16.5	15.0	17.5	14.5	15.0	13.0
22	4.0	2.5	11.5	9.0	14.0	11.5	18.0	15.5	17.0	15.0	14.5	13.0
23	5.0	3.0	12.5	9.5	15.5	11.5	16.5	14.5	17.0	14.5	14.0	13.5
24	5.5	4.0	13.0	10.0	14.0	12.0	16.0	14.5	16.0	14.5	14.0	13.5
25	5.5	4.0	13.5	10.5	15.5	12.0	17.0	14.5	16.5	14.5	14.0	13.0
26	5.5	3.5	13.5	10.0	13.5	11.5	15.5	14.5	16.0	14.5	13.5	13.0
27	5.5	3.5	13.5	11.0	15.5	12.5	16.5	14.0	15.5	14.0	13.5	13.0
28	5.5	4.0	13.0	11.0	16.5	12.5	18.0	15.0	16.5	14.0	13.5	13.5
29	6.0	4.0	13.0	10.5	17.5	13.0	16.0	14.0	15.0	14.0	14.5	13.5
30	6.0	4.5	13.5	11.5	15.5	12.0	15.5	14.5	16.0	14.0	15.5	14.0
31	---	---	13.0	10.0	---	---	16.0	13.5	15.0	14.0	---	---
MONTH	6.0	.5	13.5	5.0	17.5	9.0	18.0	12.0	19.0	13.0	17.0	12.5

04057820 MIDDLE BRANCH ESCANABA RIVER NEAR GREENWOOD, MI

LOCATION.--Lat 46°25'12", long 87°47'50", in NW¼ sec.3, T.46 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on right bank 10 ft (3 m) downstream from county highway bridge, 100 ft (30 m) downstream from Bell Creek and 5.0 mi (8.0 km) southwest of Greenwood.

DRAINAGE AREA.--73.3 mi² (189.8 km²).

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1961-72, and annual maximum, water years 1970-72, October 1972 to September 1982 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 1,400 ft (427 m) from topographic map (nearest 10 ft). Oct. 2, 1960 to Sept. 20, 1973, nonrecording gage and Sept. 11, 1969, to Sept. 20, 1973, crest-stage gage at present site and datum.

REMARKS.--Records good except those for winter period and those for period of no gage-height record, Dec. 20 to Jan. 26, which are fair. Since December 1972, considerable regulation 2.1 mi (3.4 km) upstream (station 04057814) and 2.6 mi (4.2 km) upstream (station 04057811). Since January 1973 some flow diverted 2.3 mi (3.7 km) upstream at Greenwood Afterbay, to Greek Creek (station 04057813) for iron ore processing and part returned to Middle Branch Escanaba River 24 mi (39 km) downstream via another Green Creek (station 04058130). Since October 1979, some diversion returned 28 mi (45 km) downstream via Goose Lake Outlet (station 04058400) and East Branch Escanaba River. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--10 years, 83.4 ft³/s (2.362 m³/s), 15.45 in/yr (392 mm/yr), adjusted for storage and diversion.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,130 ft³/s (32.0 m³/s) Apr. 26, 1979, gage height, 13.40 ft (4.084 m); minimum observed, 8.62 ft³/s (0.24 m³/s) Aug. 22, 1962, discharge measurement; minimum daily, 12 ft³/s (0.34 m³/s) Dec. 28, 1972, Jan. 2-4, Nov. 5, 1973, result of construction upstream.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 768 ft³/s (21.7 m³/s) Apr. 27, gage height, 12.63 ft (3.850 m); minimum daily, 25 ft³/s (0.71 m³/s) Dec. 14-17, 19.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	32	27	26	26	26	26	34	543	55	30	64	45
2	32	27	26	26	26	26	33	514	48	30	63	57
3	32	27	26	26	26	26	39	476	42	30	100	59
4	31	26	26	26	26	26	34	433	41	31	122	53
5	29	26	26	26	26	26	32	380	40	31	130	57
6	29	26	26	26	26	26	29	405	39	31	120	68
7	30	26	26	26	26	26	27	456	39	31	100	66
8	29	26	26	26	26	26	26	513	33	31	86	59
9	28	26	26	26	26	26	26	472	32	30	74	54
10	27	26	26	27	26	26	26	417	56	33	62	49
11	27	26	26	27	26	26	26	367	60	64	54	49
12	27	27	26	27	26	27	28	334	58	94	47	50
13	27	27	26	27	26	26	32	306	55	119	40	54
14	27	27	25	27	26	28	32	273	48	124	37	58
15	27	27	25	27	26	26	34	242	49	129	35	58
16	27	27	25	27	26	26	41	217	50	147	33	62
17	27	27	25	27	26	26	46	190	48	167	31	63
18	34	27	26	27	26	26	42	178	44	172	29	62
19	36	27	25	27	26	26	44	166	41	149	29	61
20	33	27	26	27	26	27	41	154	37	119	30	68
21	32	27	26	27	26	27	41	130	37	94	29	71
22	31	27	26	26	26	27	41	114	40	84	32	72
23	29	27	26	26	26	27	49	100	39	66	35	67
24	28	27	26	26	26	28	66	92	36	55	37	67
25	28	27	26	26	26	29	156	84	36	48	36	66
26	28	27	26	26	26	29	602	79	33	41	34	61
27	28	27	26	26	26	29	755	72	32	37	39	58
28	28	27	26	26	26	29	720	67	31	36	35	56
29	28	26	26	26	---	29	635	62	31	34	33	56
30	28	26	26	26	---	30	567	60	30	50	36	62
31	28	---	26	26	---	33	---	55	---	58	35	---
TOTAL	907	800	801	818	728	841	4304	7951	1260	2195	1667	1748
MEAN	29.3	26.7	25.8	26.4	26.0	27.1	143	256	42.0	70.8	53.8	59.6
MAX	36	27	26	27	26	33	755	543	68	172	130	72
MIN	27	26	25	26	26	26	26	55	30	30	29	45

CAL YR 1981 TOTAL 22543 MEAN 61.8 MAX 417 MIN 25 MEAN+ 76.5 CFSM+ 1.04 IN+ 14.17
WTR YR 1982 TOTAL 24060 MEAN 65.9 MAX 755 MIN 25 MEAN+ 82.2 CFSM+ 1.12 IN+ 15.22

+ Adjusted for diversion and change in contents in Greenwood Reservoir.

04058000 MIDDLE BRANCH ESCANABA RIVER NEAR ISHPEMING, MI

LOCATION.--Lat 46°23'40", long 87°45'30", in NW¼ SW¼ sec.12, T.46 N., R.28 W., Marquette County, Hydrologic Unit 04030110, at former gaging station on left bank 0.5 mi (0.8 km) downstream from County Highway 581, 6 mi (10 km) southwest of Ishpeming, and 10 mi (16 km) east of Republic.

DRAINAGE AREA.--128 mi² (332 km²).

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: August 1961 to September 1975, October 1976 to September 1982 (discontinued).

INSTRUMENTATION.--Temperature recorder since Aug. 24, 1961.

REMARKS.--Temperature recorder clock stopped Apr. 22 to May 20 (range in temperature 0.0 to 12.5°C); no record Aug. 25-29. Complete ice cover during winter period. Some regulation and diversion 6 mi (10 km) upstream since December 1972.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 26.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 20.5°C July 17-19; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	9.0	7.5	7.0	7.0	1.5	1.5	.0	.0	.0	.0	.0	.0
2	7.5	7.0	7.0	6.0	1.5	1.5	.0	.0	.0	.0	.0	.0
3	7.0	6.5	6.0	5.0	1.5	1.5	.0	.0	.0	.0	.0	.0
4	7.0	7.0	5.5	5.0	1.5	1.5	.0	.0	.0	.0	.0	.0
5	8.0	7.0	6.0	5.5	1.5	1.5	.0	.0	.0	.0	.0	.0
6	8.0	8.0	6.0	5.5	1.5	1.5	.0	.0	.0	.0	.0	.0
7	8.0	8.0	5.5	4.5	1.5	1.0	.0	.0	.0	.0	.0	.0
8	8.0	7.5	4.5	4.5	1.0	1.0	.0	.0	.0	.0	.0	.0
9	7.5	7.5	4.5	4.0	1.0	1.0	.0	.0	.0	.0	.0	.0
10	7.5	7.5	4.0	4.0	1.0	1.0	.0	.0	.0	.0	.0	.0
11	8.0	7.5	4.0	3.5	1.0	1.0	.0	.0	.0	.0	.0	.0
12	8.5	8.0	3.5	3.5	1.0	1.0	.0	.0	.0	.0	.0	.0
13	9.0	8.5	3.5	3.5	1.0	1.0	.0	.0	.0	.0	.0	.0
14	9.0	9.0	3.5	3.5	1.0	.5	.0	.0	.0	.0	.0	.0
15	9.0	9.0	4.0	3.5	.5	.0	.0	.0	.0	.0	.0	.0
16	9.0	8.5	4.5	4.0	.0	.0	.0	.0	.0	.0	.0	.0
17	8.5	8.5	4.5	4.5	.0	.0	.0	.0	.0	.0	.0	.0
18	8.5	7.5	4.5	4.5	.0	.0	.0	.0	.0	.0	.0	.0
19	7.5	6.0	4.5	3.5	.0	.0	.0	.0	.0	.0	.0	.0
20	6.0	5.0	3.5	3.0	.0	.0	.0	.0	.0	.0	.0	.0
21	5.0	5.0	3.0	2.5	.0	.0	.0	.0	.0	.0	.0	.0
22	5.0	5.0	2.5	2.0	.0	.0	.0	.0	.0	.0	.0	.0
23	5.0	5.0	2.0	1.5	.0	.0	.0	.0	.0	.0	.0	.0
24	5.0	3.5	2.0	1.5	.0	.0	.0	.0	.0	.0	.0	.0
25	3.5	3.5	1.5	1.5	.0	.0	.0	.0	.0	.0	.0	.0
26	3.5	3.5	1.5	1.5	.0	.0	.0	.0	.0	.0	.0	.0
27	4.0	3.5	1.5	1.5	.0	.0	.0	.0	.0	.0	.0	.0
28	4.5	4.0	1.5	1.5	.0	.0	.0	.0	.0	.0	.0	.0
29	5.0	4.5	1.5	1.5	.0	.0	.0	.0	---	---	2.0	.0
30	6.0	5.0	1.5	1.5	.0	.0	.0	.0	---	---	2.0	1.5
31	7.0	6.0	---	---	.0	.0	.0	.0	---	---	1.5	1.0
MONTH	9.0	3.5	7.0	1.5	1.5	.0	.0	.0	.0	.0	2.0	.0

04058000 MIDDLE BRANCH ESCANABA RIVER NEAR ISHPEMING, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	1.0	.5	---	---	15.5	13.5	16.5	13.5	16.5	16.5	15.5	14.0
2	.5	.0	---	---	14.5	12.5	15.5	13.5	17.0	15.5	15.5	14.5
3	.0	.0	---	---	14.5	12.0	15.5	14.5	17.5	16.5	15.5	14.5
4	.0	.0	---	---	15.0	12.5	14.5	13.5	17.5	17.5	15.0	14.0
5	.0	.0	---	---	16.5	11.5	17.0	14.5	17.5	17.0	15.0	14.0
6	.0	.0	---	---	16.5	13.5	19.0	17.0	18.5	17.5	14.0	13.5
7	.0	.0	---	---	17.0	15.0	19.0	18.5	18.5	18.5	13.5	12.0
8	.0	.0	---	---	17.0	15.0	19.0	15.5	18.5	18.0	14.0	13.0
9	.0	.0	---	---	15.0	13.0	18.0	17.0	18.0	16.0	16.0	14.0
10	.0	.0	---	---	13.5	13.0	17.0	15.5	16.0	14.0	16.0	15.5
11	1.0	.0	---	---	14.0	12.0	16.0	15.0	15.0	13.5	18.0	16.0
12	.5	.0	---	---	14.0	13.5	17.0	15.0	15.5	13.5	18.5	18.0
13	.0	.0	---	---	14.0	12.0	18.5	17.0	15.5	14.0	18.5	18.0
14	1.0	.0	---	---	14.0	12.5	18.5	18.0	16.0	15.0	18.0	15.0
15	.5	.5	---	---	13.5	13.0	19.5	18.5	16.5	14.5	15.0	13.5
16	.5	.0	---	---	14.0	11.0	20.0	19.0	18.0	16.0	13.5	13.0
17	.0	.0	---	---	14.5	13.5	20.5	20.0	18.0	15.0	13.5	13.5
18	.0	.0	---	---	13.5	11.5	20.5	20.0	17.0	14.0	13.5	13.0
19	.0	.0	---	---	13.0	11.5	20.5	19.0	18.0	16.0	13.5	13.0
20	.0	.0	---	---	13.0	12.5	19.5	18.5	18.0	15.5	13.5	13.0
21	.0	.0	12.0	10.0	12.5	11.5	19.5	18.5	16.0	14.0	13.0	12.5
22	---	---	13.0	11.0	14.5	12.5	20.0	18.5	15.5	14.5	13.0	12.5
23	---	---	14.0	11.5	15.5	12.5	20.0	17.5	15.0	14.0	13.0	13.0
24	---	---	14.5	12.5	15.5	13.5	19.5	17.0	15.0	13.5	13.0	13.0
25	---	---	15.0	12.5	15.5	13.5	19.0	17.5	---	---	13.0	12.5
26	---	---	16.0	13.5	15.5	12.5	19.0	17.5	---	---	12.5	12.5
27	---	---	16.0	14.0	15.5	13.5	18.5	16.5	---	---	13.0	12.5
28	---	---	16.5	15.0	16.5	14.5	18.5	16.5	---	---	13.0	13.0
29	---	---	16.5	16.0	17.5	14.5	18.5	16.0	---	---	13.5	13.0
30	---	---	17.0	15.0	16.5	13.5	16.5	15.5	15.0	---	15.0	13.5
31	---	---	17.0	15.0	---	---	16.5	15.0	15.0	14.0	---	---
MONTH					17.5	11.0	20.5	13.5			18.5	12.0

04058100 MIDDLE BRANCH ESCANABA RIVER NEAR PRINCETON, MI

LOCATION.--Lat 46°19'02", long 87°30'07", in NW¼ sec.12, T.45 N., R.26 W., Marquette County, Hydrologic Unit 04030110, on right bank 400 ft (122 m) downstream from powerplant, 0.3 mi (0.5 km) upstream from Green Creek, and 2.2 mi (3.5 km) northwest of Princeton.

DRAINAGE AREA.--210 mi² (544 km²).

PERIOD OF RECORD.--July 1961 to September 1982 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 1,102.68 ft (336.097 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated by powerplant above station. Since December 1972, additional regulation 27 mi (43 km) upstream (station 04057814). Since January 1973, some flow diverted to Green Creek 27 mi (43 km) upstream (station 04057813) by industry for iron ore processing, part returned 0.3 mi (0.5 km) downstream via another Green Creek (station 04058130). Since October 1979 part of diversion returned 5 mi (8 km) downstream via Goose Lake Outlet (station 04058400) and East Branch Escanaba River. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 224 ft³/s (6.344 m³/s), 14.49 in/yr (368 mm/yr), adjusted for storage and diversion since December 1972.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,580 ft³/s (73.1 m³/s) May 6, 1972, gage height, 7.85 ft (2.393 m); maximum gage height, 8.37 ft (2.551 m) Apr. 27, 1979; minimum discharge recorded, 2.2 ft³/s (0.062 m³/s) Oct. 5, 1964; minimum daily, 4.1 ft³/s (0.12 m³/s) Feb. 4, 1967.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 25 and 26, 1960, reached a stage of 10.5 ft (3.20 m) from floodmark, discharge, 3,850 ft³/s (109 m³/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,630 ft³/s (46.2 m³/s) Apr. 28, gage height, 6.52 ft (1.987 m); minimum, 50 ft³/s (1.42 m³/s) Aug. 16; minimum gage height, 1.25 ft (0.381 m) Oct. 29, Mar. 4, June 7, Aug. 16; minimum daily discharge, 87 ft³/s (2.46 m³/s) Jan. 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	100	196	124	101	106	92	201	1130	197	95	124	171
2	249	172	124	102	106	93	138	1030	195	89	201	173
3	274	136	124	102	102	93	194	952	180	89	226	183
4	278	136	123	105	101	88	249	860	154	91	423	209
5	382	153	120	104	101	91	357	765	143	89	445	218
6	295	166	120	104	101	91	239	768	146	89	367	304
7	128	134	120	106	105	91	199	840	128	99	318	404
8	261	134	109	106	106	93	195	899	132	95	287	265
9	240	134	97	108	105	91	194	950	129	95	243	214
10	198	134	104	110	104	91	194	934	126	95	217	213
11	200	134	104	112	104	91	193	845	124	165	199	211
12	181	134	104	110	104	91	194	762	125	549	176	208
13	177	134	105	110	104	94	336	721	130	487	168	207
14	174	134	105	110	105	93	337	677	175	415	165	209
15	174	131	104	110	103	93	311	618	188	368	163	211
16	151	131	104	110	99	93	316	543	180	390	139	211
17	118	131	107	110	97	91	407	463	178	469	111	213
18	202	131	104	110	96	91	449	444	172	532	99	215
19	419	131	101	110	95	91	502	439	168	524	99	216
20	318	131	101	110	93	91	462	405	168	429	99	218
21	415	131	101	105	93	91	399	375	158	288	99	272
22	311	131	101	105	92	91	403	385	152	267	100	241
23	246	122	101	105	92	93	434	374	152	233	100	243
24	260	106	101	105	91	94	570	305	138	202	101	230
25	244	113	101	105	93	95	766	242	128	200	103	216
26	242	124	101	100	93	97	1040	244	128	196	104	223
27	239	124	102	99	93	99	1310	232	128	169	131	215
28	197	124	101	87	93	98	1490	209	115	141	174	209
29	139	124	101	111	---	103	1480	198	105	129	173	209
30	174	124	101	110	---	109	1290	198	105	115	172	186
31	196	---	101	107	---	233	---	198	---	115	169	---
TOTAL	7182	4040	3316	3289	2777	3036	14849	18005	4447	7309	5695	6717
MEAN	232	135	107	106	99.2	97.9	495	581	148	236	184	224
MAX	419	196	124	112	106	233	1490	1130	197	549	445	404
MIN	100	106	97	87	91	88	138	198	105	89	99	171

CAL YR 1981 TOTAL 78080 MEAN 214 MAX 930 MIN 76 MEAN+ 229 CFSM+ 1.09 IN+ 14.78
WTR YR 1982 TOTAL 80662 MEAN 221 MAX 1490 MIN 87 MEAN+ 237 CFSM+ 1.13 IN+ 15.34

+Adjusted for diversion and change in contents in Greenwood Reservoir.

04058130 GREEN CREEK NEAR PRINCETON, MI

LOCATION.--Lat 46°20'02", long 87°31'58", in SW¼ SW¼ sec.35, T.46 N., R.26 W., Marquette County, Hydrologic Unit 04030110, on right bank 100 ft (30 m) downstream from bridge on State Highway 35, 3.0 mi (4.8 km) upstream from mouth, 4.0 mi (6.4 km) northwest of Princeton.

DRAINAGE AREA.--13.8 mi² (35.7 km²).

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1961-65, 1971. October 1976 to September 1982 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 1,165.74 ft (355.318 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 14, 1977, nonrecording gage at bridge 100 ft (30 m) upstream at datum 0.97 ft (0.296 m) higher.

REMARKS.--Records fair. Since October 1964, flow affected by regulation from industrial tailings pond in headwaters and some diversion into basin from Schweitzer Reservoir (station 04058190).

AVERAGE DISCHARGE.--6 years, 23.7 ft³/s (0.671 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 166 ft³/s (4.70 m³/s) Sept. 12, 1978, gage height, 5.75 ft (1.753 m); maximum gage height, 7.23 ft (2.204 m) Mar. 27, 1979, backwater from ice; minimum discharge observed, 2.84 ft³/s (0.080 m³/s) Oct. 1, 1963, discharge measurement; minimum daily, 5.0 ft³/s (0.14 m³/s) Feb. 10-13, 1982.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 65 ft³/s (1.84 m³/s) Apr. 24, 25, gage height, 4.88 ft (1.487 m); maximum gage height, 5.29 ft (1.612 m) Apr. 5, backwater from ice; minimum daily discharge, 5.0 ft³/s (0.14 m³/s) Feb. 10-13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	23	19	9.0	7.0	10	18	32	14	7.0	14	13
2	12	23	18	9.5	7.0	10	22	30	13	7.0	13	13
3	15	23	17	10	7.0	9.5	26	28	12	7.0	18	10
4	18	23	16	11	6.5	9.5	25	24	11	7.0	17	9.0
5	25	23	15	12	6.5	9.5	24	25	11	7.5	15	12
6	28	23	14	14	6.5	9.5	23	34	10	8.0	14	15
7	26	22	13	15	6.0	9.5	27	38	11	8.0	13	12
8	39	23	12	15	5.5	9.5	29	30	11	8.5	13	11
9	40	24	12	15	5.5	9.5	31	28	12	9.0	12	11
10	34	24	11	15	5.0	9.0	30	35	13	11	12	11
11	29	24	11	15	5.0	9.0	29	36	12	27	11	12
12	27	20	10	14	5.0	9.5	31	36	11	21	11	12
13	25	20	9.5	13	5.0	10	35	45	11	17	10	12
14	25	21	9.5	12	5.5	11	38	45	11	16	10	15
15	25	22	9.5	11	6.0	12	42	41	10	17	9.6	16
16	24	22	9.0	10	6.5	12	45	37	10	20	9.3	15
17	24	17	9.0	10	7.0	11	47	34	10	17	8.5	14
18	29	16	8.5	9.5	7.5	11	45	35	9.5	16	9.1	14
19	27	16	8.5	9.0	8.0	11	43	32	9.0	14	9.3	13
20	25	17	9.0	8.5	8.5	11	45	31	9.0	13	8.8	14
21	25	19	9.5	8.0	9.0	11	47	28	9.0	13	8.4	14
22	26	20	9.5	8.0	9.5	11	50	21	9.0	13	11	12
23	25	19	9.0	7.5	9.5	10	57	19	9.0	16	11	12
24	24	19	9.0	7.5	10	10	63	17	8.5	16	9.1	13
25	24	18	9.0	7.0	10	10	65	17	8.5	16	8.8	14
26	25	19	8.5	7.0	10	10	60	17	8.0	15	9.3	13
27	24	20	8.5	7.0	10	10	48	16	8.0	15	11	12
28	24	21	8.5	7.0	10	11	39	15	7.5	14	9.6	12
29	24	22	8.0	6.5	---	12	36	15	7.5	13	9.3	12
30	24	20	8.0	6.0	---	14	34	15	7.5	17	9.6	12
31	24	---	8.5	6.5	---	16	---	14	---	15	9.3	---
TOTAL	778	623	336.5	315.5	204.5	328.0	1154	870	303.0	421.0	344.0	380.0
MEAN	25.1	20.8	10.9	10.2	7.30	10.6	38.5	28.1	10.1	13.6	11.1	12.7
MAX	40	24	19	15	10	16	65	45	14	27	18	16
MIN	12	16	8.0	6.0	5.0	9.0	18	14	7.5	7.0	8.4	9.0

CAL YR 1981 TOTAL 7938.0 MEAN 21.7 MAX 64 MIN 6.8
WTR YR 1982 TOTAL 6057.5 MEAN 16.6 MAX 65 MIN 5.0

04058190 SCHWEITZER RESERVOIR NEAR PALMER, MI

LOCATION.--Lat 46°25'00", long 87°38'48", in SE¼ NW¼ sec.2, T.46 N., R.27 W., Marquette County, Hydrologic Unit 04030110, on left bank 120 ft (36 m) upstream from dam on Schweitzer Creek, and 3.0 mi (4.8 km) southwest of Palmer.

DRAINAGE AREA.--23.1 mi² (59.8 km²).

PERIOD OF RECORD.--January 1963 to current year (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is 1,300.00 ft (396.240 m) Cleveland-Cliffs Iron Co. datum; gage readings have been reduced to elevations NGVD. Prior to Oct. 25, 1967, nonrecording gage at same site and datum.

REMARKS.--Reservoir is formed by an earthfill dam with fixed crest concrete spillway completed in 1963. Usable capacity of reservoir is 5,300 acre-ft (6.53 hm³) at spillway elevation 1,338.00 ft (407.822 m). The dam includes a discharge pipe equipped with valve to control release flow to Schweitzer Creek (station 04058200). An average of 2.2 ft³/s (0.062 m³/s) was diverted from the headwaters of basin by the city of Ishpeming for municipal supply and the effluent discharged to the Carp River basin. An average of 18 ft³/s (0.51 m³/s) was diverted from reservoir for iron ore processing, some returned to Middle Branch Escanaba River basin via Green Creek and some returned to the East Branch Escanaba River basin via Goose Lake Outlet. Since January 1973, controlled diversion from Greenwood Reservoir (station 04057811) via Greenwood Diversion (station 04057813) into Schweitzer Reservoir. Controlled inflow averaged 11.9 ft³/s (0.34 m³/s) for the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents recorded, 5,900 acre-ft (7.27 hm³) May 31, 1970, elevation, 1,339.5 ft (408.28); minimum recorded since first filling, 2,920 acre-ft (3.60 hm³) Apr. 10, 1974, elevation, 1,329.7 ft (405.29 m).

EXTREMES FOR CURRENT YEAR.--Maximum contents, 5,620 acre-ft (6.93 hm³) Apr. 25, elevation, 1,338.8 ft (408.07 m); minimum, 3,900 acre-ft (4.81 hm³) about Feb. 15, elevation, 1,333.5 ft (406.45).

MONTHEND ELEVATION, IN FEET NGVD, AND CONTENTS AT 2400, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)	Change in contents (equivalent in ft³/s)
Sept. 30	1337.0	4950	--	--
Oct. 31	1337.1	4980	+30	+0.5
Nov. 30	1335.7	4560	-420	-7.1
Dec. 31	1334.7	4260	-300	-4.9
CAL YR 1981	--	--	-800	-1.1
Jan. 31	1334.3	4140	-120	-2.0
Feb. 28	1333.6	3930	-210	-3.8
Mar. 31	1335.0	4350	+420	+6.8
Apr. 30	1338.3	5420	+1070	+18.0
May 31	1338.2	5380	-40	-0.7
June 30	1337.9	5260	-120	-2.0
July 31	1338.1	5340	+80	+1.3
Aug. 31	1338.0	5300	-40	-0.7
Sept. 30	1338.1	5340	+40	+0.7
WTR YR 1982	--	--	+390	+0.5

STREAMS TRIBUTARY TO LAKE MICHIGAN

04058200 SCHWEITZER CREEK NEAR PALMER, MI

LOCATION.--Lat 46°24'40", long 87°37'27", in SW¼ sec.1, T.46 N., R.27 W., Marquette County, Hydrologic Unit 04030110, on right bank 10 ft (3 m) upstream from highway bridge, and 2.5 mi (4.0 km) southwest of Palmer.

DRAINAGE AREA.--23.6 mi² (61.1 km²).

PERIOD OF RECORD.--October 1960 to current year.

GAGE.--Water-stage recorder. Concrete control since Oct. 1, 1963. Altitude of gage is 1,270 ft (387 m) from topographic map (nearest 10 ft). Prior to Aug. 21, 1961, nonrecording gage at same site and datum.

REMARKS.--Records good. Since August 1962, flow completely regulated by Schweitzer Reservoir (station 04058190) 1.0 mi (1.6 km) upstream. An average of 2.2 ft³/s (0.062 m³/s) was diverted from headwaters of basin by the city of Ishpeming for municipal supply and the effluent discharged to the Carp River basin. An average of 18 ft³/s (0.51 m³/s) was diverted from Schweitzer Reservoir by industry for iron ore processing, some returned to the Middle Branch Escanaba River via Green Creek (station 04058130) and some returned via Goose Lake Outlet (station 04058400) and East Branch Escanaba River. Diversion into Schweitzer Reservoir from Greenwood Reservoir via Greenwood Diversion (station 04057813). Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 860 ft³/s (24.4 m³/s) May 31, 1970, gage height, 6.50 ft (1.981 m); minimum, 0.4 ft³/s (0.011 m³/s) Sept. 6, 1962, gage height, 1.22 ft (0.372 m); minimum daily, 1.0 ft³/s (0.028 m³/s) Apr. 9-18, May 5, 6, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 248 ft³/s (7.02 m³/s) Apr. 25, gage height, 4.79 ft (1.460 m); minimum daily, 4.8 ft³/s (0.14 m³/s) Jan. 17, 22.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.1	5.9	5.8	5.4	5.1	5.4	6.6	48	13	5.9	22	15
2	6.3	5.8	5.9	6.0	5.1	5.4	6.4	52	13	5.9	14	21
3	6.0	5.8	5.7	5.5	5.1	5.4	6.4	49	11	6.0	27	14
4	6.1	5.8	5.7	5.6	5.1	5.4	6.4	40	9.9	6.3	44	8.6
5	7.3	5.9	5.7	5.4	5.1	5.4	6.1	37	9.3	6.1	32	11
6	28	5.9	5.6	5.3	5.1	5.4	6.2	48	9.4	6.1	21	23
7	36	5.7	5.7	5.4	5.1	5.4	6.0	83	9.4	6.4	16	19
8	26	5.6	5.8	5.4	5.1	5.4	6.1	76	8.2	5.9	14	13
9	18	5.6	5.6	5.4	5.1	5.4	6.4	56	7.4	5.9	13	9.4
10	12	5.6	5.7	5.4	5.1	5.4	6.2	55	12	7.2	9.5	7.6
11	9.0	5.6	5.6	5.4	5.1	5.4	6.4	57	11	63	8.0	6.7
12	7.2	5.6	5.6	5.4	5.1	5.4	7.2	48	10	98	7.4	6.1
13	6.5	5.6	5.6	5.3	5.1	5.4	7.1	44	10	54	7.1	6.2
14	6.4	5.7	5.7	5.1	5.1	5.4	7.1	46	9.0	32	7.4	10
15	6.6	5.8	5.6	5.0	5.4	5.4	8.0	43	9.7	38	7.1	16
16	5.9	5.8	5.7	5.0	5.4	5.2	21	39	7.9	57	7.6	20
17	6.1	5.7	5.6	4.8	5.4	5.1	95	36	7.7	55	6.6	18
18	12	5.7	5.8	4.9	5.4	5.1	97	39	6.8	38	5.9	17
19	23	5.8	5.6	4.9	5.6	5.1	78	41	7.5	21	5.9	15
20	20	5.9	5.6	4.9	5.6	5.1	59	38	7.1	14	6.1	22
21	10	5.8	5.7	4.9	5.4	5.2	45	36	7.3	11	5.7	19
22	7.3	5.7	5.6	4.8	5.4	5.2	42	33	9.1	9.3	9.3	14
23	6.6	5.6	5.6	5.1	5.4	5.4	61	29	7.5	7.0	13	11
24	5.9	5.7	5.6	5.1	5.4	5.5	132	25	7.1	6.2	11	12
25	5.9	5.8	5.5	5.1	5.6	5.4	228	22	7.5	6.1	9.6	11
26	5.9	6.0	5.5	5.2	5.6	5.4	213	20	6.2	6.0	8.1	9.1
27	5.9	5.9	5.6	5.4	5.4	5.4	132	18	6.1	6.0	11	8.7
28	5.9	5.8	5.5	5.3	5.6	5.3	79	17	6.0	6.0	8.9	9.2
29	5.9	5.8	5.4	5.5	---	5.7	60	16	6.2	6.2	8.6	8.8
30	5.9	5.7	5.5	5.2	---	6.3	51	14	6.1	20	9.9	14
31	5.9	---	5.6	5.1	---	7.0	---	13	---	36	8.6	---
TOTAL	326.6	172.6	174.7	162.2	148.0	168.4	1491.6	1218	258.4	651.5	385.3	395.4
MEAN	10.5	5.75	5.64	5.23	5.29	5.43	49.7	39.3	8.61	21.0	12.4	13.2
MAX	36	6.0	5.9	6.0	5.6	7.0	228	83	13	98	44	23
MIN	5.9	5.6	5.4	4.8	5.1	5.1	6.0	13	6.0	5.9	5.7	6.1

CAL YR 1981 TOTAL 3650.4 MEAN 10.0 MAX 105 MIN 5.4
WTR YR 1982 TOTAL 5552.7 MEAN 15.2 MAX 228 MIN 4.8

04058400 GOOSE LAKE OUTLET NEAR SANDS STATION, MI

LOCATION.--Lat 46°23'36", long 87°29'40", in SE¼ SE¼ sec.12, T.46 N., R.26 W., Marquette County, Hydrologic Unit 04030110, on left bank 0.8 mi (1.3 km) upstream from mouth, and 3 mi (5 km) west of Sands Station.

DRAINAGE AREA.--37.5 mi² (97.1 km²).

PERIOD OF RECORD.--October 1965 to September 1982 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 1,160 ft (354 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for winter period and those for period of indefinite stage-discharge relation, Aug. 5 to Sept. 23, which are fair. Flow includes an average of 6.3 ft³/s (0.18 m³/s) discharged into basin from mine tailings pond 3 mi (5 km) upstream, the greater part diverted from Schweitzer Reservoir (station 04058190). Diversion began October 1979.

AVERAGE DISCHARGE.--10 years (water years 1966-75), 32.8 ft³/s (0.929 m³/s), 11.88 in/yr (302 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 458 ft³/s (13.0 m³/s) May 31, 1970, gage height, 5.89 ft (1.795 m); minimum, 3.7 ft³/s (0.10 m³/s) Oct. 10, 1976, Jan. 22, Feb. 14 and part or all of each day Feb. 16-23, Feb. 26 to Mar. 8, 1977, gage height, 1.35 ft (0.411 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 279 ft³/s (7.90 m³/s) Apr. 25, gage height, 4.94 ft (1.506 m); minimum daily, 7.0 ft³/s (0.20 m³/s) Aug. 21.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	20	17	22	19	21	34	125	27	10	19	13
2	25	21	19	22	19	20	38	112	24	9.6	19	17
3	23	20	23	22	18	20	54	99	23	9.8	27	18
4	22	21	22	22	19	20	59	88	20	13	27	12
5	21	21	22	21	18	20	60	80	19	9.4	21	11
6	20	22	21	20	18	20	53	84	18	9.4	18	17
7	23	20	23	20	18	19	66	89	17	10	16	17
8	21	21	22	20	17	19	68	86	16	9.3	14	13
9	19	21	21	20	18	19	72	79	16	8.8	13	11
10	18	21	22	20	18	19	68	79	18	9.4	12	10
11	16	20	22	20	18	20	66	75	16	22	11	16
12	15	17	21	20	18	20	66	70	16	19	11	18
13	15	16	22	20	18	22	67	73	16	23	10	16
14	16	16	22	20	19	21	73	71	15	21	9.5	19
15	18	16	20	20	19	21	82	66	16	19	9.0	21
16	19	15	22	20	19	21	96	62	15	21	9.0	22
17	20	15	22	20	19	21	120	58	14	19	8.5	21
18	24	15	21	20	19	20	141	60	14	18	8.0	19
19	32	16	21	20	20	20	149	58	13	16	7.5	18
20	31	16	20	20	20	20	143	56	13	15	7.5	23
21	31	16	21	19	20	21	153	52	13	13	7.0	26
22	29	17	21	20	20	21	124	48	13	12	12	21
23	28	15	20	20	20	21	128	46	12	11	15	17
24	27	15	20	20	20	22	174	42	12	10	12	16
25	27	15	20	20	21	19	258	40	12	9.6	10	19
26	26	16	21	20	20	19	264	37	12	9.6	11	18
27	23	18	21	20	20	19	224	34	11	13	11	18
28	22	17	22	19	22	19	189	33	11	10	10	19
29	22	17	21	19	---	21	159	31	11	15	10	16
30	22	17	21	19	---	24	140	29	10	17	11	21
31	22	---	22	19	---	31	---	28	---	16	8.5	---
TOTAL	698	533	655	624	534	640	3388	1990	463	427.9	394.5	523
MEAN	22.5	17.8	21.1	20.1	19.1	20.6	113	64.2	15.4	13.8	12.7	17.4
MAX	32	22	23	22	22	31	264	125	27	23	27	26
MIN	15	15	17	19	17	19	34	28	10	8.8	7.0	10

CAL YR 1981 TOTAL 12818.0 MEAN 35.1 MAX 132 MIN 12
WTR YR 1982 TOTAL 10870.4 MEAN 29.8 MAX 264 MIN 7.0

04059000 ESCANABA RIVER AT CORNELL, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°54'31", long 87°12'49", in NW¼ sec.32, T.41 N., R.23 W., Delta County, Hydrologic Unit 04030110, on right bank 50 ft (15 m) downstream from bridge on County Road 519, 0.4 mi (0.6 km) downstream from Bobs Creek, 0.7 mi (1.1 km) northeast of Cornell, and 16 mi (26 km) upstream from mouth.

DRAINAGE AREA.--870 mi² (2,253 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1903 to December 1912, January 1913 to November 1915 (gage heights only), October 1950 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "near Escanaba" 1903-15.

REVISED RECORDS.--WSP 1387: 1904.

GAGE.--Water-stage recorder. Datum of gage is 749.26 ft (228.374 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). August 1903 to November 1915, nonrecording gage at site 10 mi (16 km) downstream at different datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Since 1950, diurnal fluctuation and occasional slight regulation caused by Boney Falls powerplant 7 mi (11 km) upstream. Since August 1962, some regulation by Schweitzer Reservoir (station 04058190) about 50 mi (80 km) upstream. Since December 1972, some regulation by Greenwood Reservoir (station 04057811) about 60 mi (97 km) upstream.

AVERAGE DISCHARGE.--41 years, (water years 1904-12, 1951-82), 887 ft³/s (25.12 m³/s), 13.85 in/yr (352 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,700 ft³/s (303 m³/s) Apr. 26, 1979, gage height, 5.00 ft (1.524 m); maximum gage height, 6.40 ft (1.951 m) Apr. 9, 1971, backwater from ice; minimum discharge observed, 90 ft³/s (2.55 m³/s) July 5, 1910, gage height, 1.5 ft (0.46 m), site and datum then in use, but may have been less during extended periods of no gage-height record during winter periods of 1903-12, or periods of ice effect in 1959.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,000 ft³/s (170 m³/s) Apr. 26, gage height, 3.99 ft (1.216 m); maximum gage height, 4.29 ft (1.308 m) Apr. 6, backwater from ice; minimum daily discharge, 240 ft³/s (6.80 m³/s) Dec. 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	455	611	492	290	330	330	950	3330	575	331	651	567
2	838	584	515	320	330	340	1000	2960	577	302	586	801
3	939	554	483	300	320	340	1150	2700	535	289	759	846
4	936	491	458	270	340	330	1300	2470	505	317	1340	718
5	861	520	475	250	320	310	1400	2260	445	403	1520	751
6	1090	568	435	300	320	320	1450	2300	433	382	1310	1180
7	949	560	480	330	330	340	1300	2690	425	350	969	1420
8	871	528	420	350	330	310	1200	2820	405	325	827	1380
9	937	510	350	350	320	310	1250	2720	405	304	723	978
10	767	487	310	340	320	310	1300	2670	435	326	630	829
11	703	480	320	350	300	280	1350	2570	475	1470	599	759
12	660	487	350	340	300	290	1350	2390	445	3020	528	683
13	585	459	420	330	310	320	1500	2270	465	3050	471	682
14	600	453	400	320	310	260	2000	2270	470	3090	470	1410
15	665	462	350	320	310	350	2610	2140	595	2690	434	1740
16	659	445	300	310	300	360	3040	1870	608	2730	436	1730
17	628	464	240	310	300	350	3290	1670	585	2460	384	1610
18	811	437	260	300	300	370	3310	1550	530	2200	369	1540
19	1150	443	300	300	310	390	3500	1510	495	1810	334	1370
20	1300	440	250	310	320	380	3160	1420	495	1370	341	1330
21	1030	442	300	280	320	370	2650	1300	475	1070	320	1390
22	1100	403	420	280	330	340	2710	1140	525	810	344	1300
23	817	408	370	280	340	330	2940	1080	515	759	433	1130
24	784	389	350	290	340	380	3720	987	495	644	453	1110
25	762	473	310	270	330	430	4900	795	465	609	402	1310
26	705	441	330	280	320	430	5740	764	390	541	404	1290
27	695	495	380	280	320	420	5410	705	390	547	468	1140
28	686	539	360	270	320	410	4760	664	372	490	531	1010
29	607	596	330	270	---	480	4320	625	342	448	552	938
30	562	517	320	320	---	560	3750	585	335	497	550	937
31	605	---	320	330	---	700	---	585	---	669	568	---
TOTAL	24757	14686	11398	9440	8940	11440	78310	55810	14207	34303	18706	33879
MEAN	799	490	368	305	319	369	2610	1800	474	1107	603	1129
MAX	1300	611	515	350	340	700	5740	3330	608	3090	1520	1740
MIN	455	389	240	250	300	260	950	585	335	289	320	567
CFSM	.92	.56	.42	.35	.37	.42	3.00	2.07	.55	1.27	.69	1.30
IN.	1.06	.63	.49	.40	.38	.49	3.35	2.39	.61	1.47	.80	1.45

CAL YR 1981 TOTAL 283083 MEAN 776 MAX 3690 MIN 200 CFSM .89 IN 12.10
WTR YR 1982 TOTAL 315876 MEAN 865 MAX 5740 MIN 240 CFSM .99 IN 13.51

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1969-73, 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1975 to September 1981. Since October 1975, daily figures of instrument-recorded conductance below 200 micromhos are not representative due to variability within the stream cross-section. Results of a study of this variance are available in the District files.
WATER TEMPERATURES: February 1975 to September 1981.

INSTRUMENTATION.--Water-quality monitor October 1975 to September 1981.

REMARKS.--Bimonthly samples were collected during the year as a cross-section sample in the reach of stream from the bridge on County Road 519 to a point 200 ft (61 m) downstream. Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily (water years 1975-76, 1978-80), 360 micromhos Sept. 10, 1975; minimum observed (water years 1975-76, 1978-81), 114 micromhos Apr. 15, 1981.
WATER TEMPERATURES: Maximum daily, 35.0°C July 31, 1975; minimum, 0.0°C on many days during winter periods.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--A specific conductance of 84 micromhos was observed Apr. 28, 1982.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV												
09...	1350	495	202	7.7	5.0	13.0	103	K9	K7	84	4.0	20
JAN												
13...	1300	380	262	7.3	.0	12.1	95	15	--	100	.00	23
MAR												
16...	1230	425	265	7.4	.0	12.2	96	K7	310	100	.00	24
APR												
28...	1330	4880	84	7.3	6.0	11.5	93	24	42	42	11	9.8
JUN												
29...	1150	327	193	8.0	21.0	9.9	114	K6	260	100	9.0	24
SEP												
22...	1110	1260	142	8.2	10.0	11.4	105	K14	65	77	1.0	18

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
NOV												
09...	8.3	9.7	20	.5	80	12	4.5	.1	8.2	131	112	.18
JAN												
13...	11	20	30	1.0	110	18	5.5	.1	13	161	158	.22
MAR												
16...	9.7	18	28	1.2	110	23	6.3	.2	11	175	160	.24
APR												
28...	4.2	3.1	14	.7	31	8.0	2.2	<.1	5.5	72	52	.10
JUN												
29...	9.7	3.6	7	.7	91	7.0	3.1	<.1	6.0	133	109	.18
SEP												
22...	7.7	1.7	--	<.1	76	6.0	2.3	<.1	7.4	120	89	.16

STREAMS TRIBUTARY TO LAKE MICHIGAN

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982--CONTINUED

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV												
09...	175	.15	<.010	.01	.31	.040	.12	.010	<.010	2	2.7	100
JAN												
13...	165	.21	.040	.05	.43	<.010	--	<.010	<.010	24	25	94
MAR												
16...	201	.34	.010	.01	.12	.010	.03	<.010	<.010	25	29	92
APR												
28...	949	.16	<.010	.01	.52	.020	.06	.010	<.010	7	92	100
JUN												
29...	117	<.10	.030	.04	.30	--	.03	.020	<.010	3	2.6	100
SEP												
22...	408	<.10	.030	.04	1.40	.020	.06	.010	<.010	7	24	97

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
NOV										
09...	1350	1	0	100	8	<1	1	40	<10	<1
JAN										
13...	1300	1	1	100	14	--	2	10	<10	<1
APR										
28...	1330	2	1	<100	27	1	<1	20	10	<1
JUN										
29...	1150	1	<1	<100	15	1	<1	10	<10	<1

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
NOV										
09...	<1	11	1	790	400	3	2	30	13	.1
JAN										
13...	<1	8	<1	600	350	<1	<1	20	6	<.1
APR										
28...	<1	11	1	630	260	18	5	70	23	<.1
JUN										
29...	<1	5	<1	550	150	1	<1	80	12	<.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
NOV									
09...	.1	21	<1	<1	<1	<1	<1	40	5
JAN									
13...	<.1	5	<1	<1	<1	<1	<1	50	<4
APR									
28...	<.1	3	1	<1	<1	<1	<1	10	8
JUN									
29...	<.1	5	<1	<1	<1	<1	<1	30	<4

04059500 FORD RIVER NEAR HYDE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°45'20", long 87°12'05", in SW¼ sec.19, T.39 N., R.23 W., Delta County, Hydrologic Unit 04030109, on right bank 40 ft (12 m) downstream from bridge on County Road 533, 1.4 mi (2.3 km) downstream from Tennile Creek, and 1.5 mi (2.4 km) north of Hyde.

DRAINAGE AREA.--450 mi² (1,166 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1954 to current year.

GAGE.--Water-stage recorder. Datum of gage is 681.77 ft (207.30 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records good except those for the winter period and those for period of no gage-height record, Jan. 17 to Mar. 17, which are fair.

AVERAGE DISCHARGE.--28 years, 383 ft³/s (10.85 m³/s), 11.56 in/yr (294 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,590 ft³/s (215 m³/s) May 7, 1960, gage height, 8.27 ft (2.521 m); minimum, 18 ft³/s (0.51 m³/s) Aug. 30, 1976, gage height, 1.33 ft (0.405 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,060 ft³/s (86.7 m³/s) Apr. 16, gage height, 5.74 ft (1.750 m); minimum, 71 ft³/s (2.01 m³/s) Aug. 21, 22, gage height, 1.74 ft (0.530 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	117	225	140	92	100	103	640	1580	177	135	259	201
2	159	215	140	92	100	103	860	1330	168	117	257	220
3	210	202	140	92	100	103	1200	1140	155	105	274	252
4	261	193	140	92	100	100	1200	982	142	104	344	268
5	283	189	135	92	100	98	1150	872	130	114	372	284
6	300	202	125	92	100	96	1100	854	118	123	345	379
7	309	198	120	93	100	96	1050	955	112	127	308	476
8	308	201	110	95	100	96	1000	1020	105	104	261	502
9	304	194	105	95	102	95	1000	1040	102	89	213	526
10	285	185	100	96	104	94	1050	1130	105	85	186	496
11	255	180	98	97	105	94	1060	1160	112	622	170	415
12	226	171	95	97	105	94	1130	1090	130	1660	153	340
13	203	164	94	98	105	94	1300	1040	143	1700	138	291
14	201	160	92	98	103	94	1410	1040	163	1800	122	502
15	239	158	92	99	102	105	1730	1010	328	1780	111	795
16	246	156	92	100	100	110	2140	896	373	2190	102	847
17	265	156	92	102	100	110	2460	785	347	2030	102	870
18	424	156	92	102	100	112	2480	693	301	1600	95	908
19	479	152	92	104	100	115	2750	644	255	1250	84	863
20	493	151	92	105	100	120	2550	597	218	1020	77	861
21	502	146	92	105	100	120	2140	546	211	794	73	852
22	471	127	92	105	102	125	1990	488	275	595	75	803
23	421	96	92	105	103	130	1960	429	251	457	75	753
24	367	93	92	105	103	140	2100	376	225	366	84	719
25	328	92	92	105	103	145	2330	327	267	306	102	792
26	306	105	92	105	103	150	2600	286	242	259	106	754
27	289	120	92	105	103	155	2600	253	206	230	117	699
28	269	130	92	105	103	170	2440	225	177	203	122	635
29	254	135	92	104	---	210	2230	205	171	179	145	559
30	241	140	92	102	---	300	1900	193	160	166	168	495
31	233	---	92	100	---	450	---	183	---	216	180	---
TOTAL	9248	4792	3198	3079	2846	4127	51550	23369	5869	20526	5220	17357
MEAN	298	160	103	99.3	102	133	1718	754	196	662	168	579
MAX	502	225	140	105	105	450	2750	1580	373	2190	372	908
MIN	117	92	92	92	100	94	640	183	102	85	73	201
CFSM	.66	.36	.23	.22	.23	.30	3.82	1.68	.44	1.47	.37	1.29
IN.	.76	.40	.26	.25	.24	.34	4.26	1.93	.49	1.70	.43	1.43

CAL YR 1981 TOTAL 129212 MEAN 354 MAX 1810 MIN 60 CFSM .79 IN 10.68
WTR YR 1982 TOTAL 151181 MEAN 414 MAX 2750 MIN 73 CFSM .92 IN 12.50

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1956 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: December 1974 to September 1981.
WATER TEMPERATURES: July 1956 to September 1981.

INSTRUMENTATION.--Temperature recorder July 1956 to September 1975. Water-quality monitor October 1975 to September 1981.

REMARKS.--Bimonthly samples were collected during the year as a cross-section sample in reach of stream 200 ft (61 m) upstream to 200 ft (61 m) downstream from gage. Complete ice cover during winter period. Daily record of specific conductance for water year 1975 is from once-daily observer samples.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 482 micromhos Dec. 2, 1976; minimum recorded, 131 micromhos May 22, 1976.
WATER TEMPERATURES: Maximum, 31.0°C July 31, 1975; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV												
10...	1115	148	282	7.[illegible]	1.5	13.8	101	8	18	160	6.0	36
JAN												
14...	1415	99	372	7.4	.0	7.2	51	<1	--	210	7.0	45
MAR												
17...	1230	111	354	7.5	.0	8.3	59	K3	130	190	8.0	44
MAY												
26...	1330	271	255	8.2	18.5	9.6	104	9	K800	150	10	34
JUN												
30...	1040	173	340	8.1	18.5	9.0	98	55	370	170	11	40
SEP												
16...	1130	846	246	7.5	11.5	10.4	96	150	300	130	11	32

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
NOV												
10...	16	1.4	2	.5	150	6.8	2.4	<.1	6.7	185	159	.25
JAN												
14...	23	2.0	2	.7	200	10	3.2	<.1	12	226	216	.31
MAR												
17...	19	1.6	2	.4	180	13	2.4	<.1	9.3	212	198	.29
MAY												
26...	15	1.1	2	.5	137	8.0	1.7	<.1	4.0	182	147	.25
JUN												
30...	17	1.4	2	.5	159	6.0	1.7	<.1	5.3	198	168	.27
SEP												
16...	13	.9	1	.5	122	6.0	2.1	<.1	8.2	187	136	.25

040-9500 FORD RIVER NEAR HYDE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982--CONTINUED

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV												
10...	93.9	.06	<.010	.01	.16	.050	.15	.040	<.010	3	1.5	100
JAN												
14...	60.4	.20	<.010	.01	.20	<.010	--	<.010	<.010	1	.27	100
MAR												
17...	63.5	.36	.030	.04	.35	.010	.03	<.010	<.010	1	.30	100
MAY												
26...	133	<.10	.070	.03	.50	.010	.03	<.010	<.010	2	1.5	100
JUN												
30...	92.5	<.10	.030	.04	.40	.020	.06	.010	<.010	4	1.9	100
SEP												
16...	427	<.10	.030	.04	1.80	.020	.06	<.010	<.010	11	25	85

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
NOV										
10...	1115	1	0	100	11	<1	1	20	<10	<1
JAN										
14...	1415	1	1	100	14	--	2	20	10	1
MAY										
26...	1330	1	1	<100	13	2	<1	20	10	--
JUN										
30...	1040	1	<1	<100	16	1	<1	10	10	<1

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
NOV										
10...	<1	--	6	230	140	--	3	10	7	.1
JAN										
14...	1	6	<2	200	89	1	<1	20	8	<.1
MAY										
26...	4	3	<2	240	110	5	2	40	18	.2
JUN										
30...	<1	10	<2	410	43	8	1	60	18	<.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
NOV									
10...	<.1	<1	<1	<1	<1	<1	<1	40	5
JAN									
14...	<.1	29	2	<1	<1	<1	<1	50	6
MAY									
26...	.2	3	1	<1	<1	<1	<1	30	<3
JUN									
30...	<.1	5	<1	<1	<1	<1	<1	50	<4

STREAMS TRIBUTARY TO LAKE MICHIGAN

04061000 BRULE RIVER NEAR FLORENCE, WI

LOCATION.--Lat 45°57'31", long 88°15'57", in SE¼ SE¼ sec.11, T.41 N., R.32 W., Michigan Meridian, Iron County, Hydrologic Unit 04030106, on left bank 40 ft (12 m) upstream from highway bridge, 1.0 mi (1.6 km) upstream from Paint River, 2.5 mi (4.0 km) north of Florence, and 5.0 mi (8.0 km) upstream from confluence with Michigamme River.

DRAINAGE AREA.--389 mi² (1,008 km²).

PERIOD OF RECORD.--January 1914 to February 1916, June 1944 to current year.

REVISED RECORDS.--WSP 1387: 1914-16. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,200.55 ft (365.928 m) National Geodetic Vertical Datum of 1929 (levels by Owen Ayres Associates). Prior to Aug. 29, 1944, nonrecording gage at bridge 40 ft (12 m) downstream at same datum.

REMARKS.--Records good except those for the winter period, which are fair. Discharge includes some mine pumpage prior to August 1977. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--39 years (water years 1915, 1945-82), 360 ft³/s (10.20 m³/s), 12.57 in/yr (319 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,700 ft³/s (133 m³/s) July 2, 1953, gage height, 6.57 ft (2.003 m); maximum gage height, 8.27 ft (2.521 m) Dec. 26, 1969, backwater from ice; minimum discharge, 118 ft³/s (3.34 m³/s) Dec. 2, 1963 (discharge measurement); minimum gage height, 1.79 ft (0.546 m) July 24, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,360 ft³/s (38.5 m³/s) Apr. 18, 26, gage height, 3.70 ft (1.128 m); maximum gage height, 7.97 ft (2.429 m) Apr. 5, backwater from ice; minimum discharge, 216 ft³/s (6.12 m³/s) Aug. 20, 21, gage height, 1.99 ft (0.607 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	375	307	283	240	250	270	490	637	360	255	359	378
2	444	298	285	240	250	270	506	599	349	250	341	414
3	386	293	287	240	250	260	505	560	322	265	324	356
4	356	292	286	250	250	250	495	542	313	284	306	321
5	362	293	284	260	250	250	490	519	296	292	289	487
6	387	296	274	260	250	245	480	739	291	377	284	845
7	399	293	290	250	250	240	460	1120	285	320	276	675
8	367	291	288	240	240	240	420	1130	277	278	267	499
9	337	287	260	240	240	240	380	922	281	269	275	416
10	317	281	230	240	240	240	350	820	369	392	272	363
11	313	293	260	250	240	250	396	758	353	972	258	342
12	310	284	280	250	230	260	408	686	314	1050	248	318
13	305	282	300	260	230	270	490	665	298	922	241	340
14	319	281	280	260	230	270	545	649	295	752	240	453
15	342	288	260	260	240	270	680	595	317	623	241	487
16	333	294	240	260	240	275	871	551	310	1060	234	507
17	342	291	230	240	250	280	1170	520	301	1030	230	460
18	494	286	240	230	250	270	1310	519	294	938	229	457
19	498	284	250	260	250	260	1250	502	276	752	228	442
20	428	292	240	240	260	260	1140	484	280	574	219	487
21	378	284	260	240	270	260	965	455	287	484	223	448
22	355	274	280	240	270	270	919	421	293	435	239	396
23	339	250	280	240	250	280	913	393	276	385	258	355
24	323	290	270	240	250	290	1040	374	270	355	250	375
25	318	295	260	240	250	290	1230	362	296	330	250	415
26	317	291	260	250	260	275	1330	356	294	319	251	412
27	313	297	270	250	270	270	1190	351	267	318	327	373
28	312	292	260	250	270	270	955	351	256	311	326	346
29	311	287	240	250	---	300	778	347	280	308	333	338
30	313	288	250	250	---	360	703	349	275	454	435	383
31	314	---	240	250	---	430	---	352	---	422	375	---
TOTAL	11007	8654	8217	7670	6980	8465	22859	17628	8965	15776	8628	12888
MEAN	355	288	265	247	249	273	762	569	299	509	278	430
MAX	498	307	300	260	270	430	1330	1130	369	1060	435	845
MIN	305	250	230	230	230	240	350	347	256	250	219	318
CFSM	.91	.74	.68	.64	.64	.70	1.96	1.46	.77	1.31	.72	1.11
IN.	1.05	.83	.79	.73	.67	.81	2.19	1.69	.86	1.51	.83	1.23

CAL YR 1981 TOTAL 146915 MEAN 403 MAX 2030 MIN 230 CFSM 1.04 IN 14.05
WTR YR 1982 TOTAL 137737 MEAN 377 MAX 1330 MIN 219 CFSM .97 IN 13.17

04061500 PAINT RIVER AT CRYSTAL FALLS, MI

LOCATION.--Lat 46°06'21", long 88°20'05", in SE¼ sec.20, T.43 N., R.32 W., Iron County, Hydrologic Unit 04030106, on right bank 150 ft (46 m) downstream from municipal powerplant at Crystal Falls, and 14.5 mi (23.3 km) upstream from mouth.

DRAINAGE AREA.--597 mi² (1,546 km²).

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1174: 1947-48(m). WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,306.1 ft (398.10 m), Wisconsin Electric Power Co. datum.

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation caused by powerplant immediately upstream; since storage capacity is small, daily flows are not affected appreciably. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--38 years, 596 ft³/s (16.88 m³/s), 13.56 in/yr (344 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,900 ft³/s (309 m³/s) Apr. 25, 1960, gage height, 9.82 ft (2.993 m); minimum, 7.7 ft³/s (0.22 m³/s) Sept. 17, 1950, gage height, 0.89 ft (0.271 m); minimum daily, 81 ft³/s (2.29 m³/s) Nov. 1, 1947.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,330 ft³/s (151 m³/s) Apr. 26, gage height, 6.78 ft (2.067 m); minimum, 132 ft³/s (3.74 m³/s) June 18, gage height, 1.75 ft (0.533 m); minimum daily, 214 ft³/s (6.06 m³/s) Aug. 21.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	469	515	392	317	340	360	642	2180	515	318	391	516
2	600	503	402	345	350	330	694	1900	498	329	356	512
3	616	468	401	330	355	310	866	1680	461	275	421	530
4	574	459	397	349	350	300	821	1510	441	275	363	488
5	543	448	400	357	340	300	954	1410	404	278	358	477
6	584	448	370	359	320	300	986	1820	332	341	357	711
7	640	444	405	356	340	300	810	2710	363	310	282	841
8	674	436	369	335	340	290	739	2930	344	300	305	721
9	653	428	314	337	320	290	709	2430	345	297	360	652
10	627	423	310	323	300	290	697	2190	378	352	292	572
11	524	416	362	330	290	290	668	2170	443	887	295	508
12	550	410	357	340	280	300	667	1900	425	1350	283	392
13	490	403	411	340	270	320	730	1670	363	1100	284	655
14	495	398	390	350	280	320	906	1590	347	863	244	816
15	551	401	340	335	290	330	1240	1440	378	766	242	881
16	588	410	302	330	290	351	1710	1270	393	1160	289	904
17	623	406	283	335	290	347	2410	1120	391	1500	253	859
18	655	406	306	345	300	350	2620	1060	362	1390	228	801
19	836	404	335	320	300	348	2680	1020	344	1110	232	746
20	843	403	325	315	310	334	2550	937	300	858	232	783
21	772	393	350	315	330	331	2180	878	350	720	214	830
22	724	380	380	315	360	337	2180	802	357	646	224	758
23	679	334	380	320	390	349	2270	719	338	633	342	679
24	664	400	350	325	420	370	3250	642	348	575	331	662
25	558	403	350	345	420	384	4610	550	378	449	308	677
26	597	402	350	330	380	368	5220	557	343	471	305	717
27	566	405	370	330	340	345	4890	529	260	409	351	693
28	547	400	350	330	350	338	4110	504	322	399	411	672
29	539	382	330	320	---	339	3190	486	302	388	411	623
30	560	393	329	320	---	396	2520	481	360	398	527	613
31	519	---	322	330	---	503	---	463	---	418	490	---
TOTAL	18860	12521	11032	10328	9245	10420	58519	41548	11185	19565	9981	20289
MEAN	608	417	356	333	330	336	1951	1340	373	631	322	676
MAX	843	515	411	359	420	503	5220	2930	515	1500	527	904
MIN	469	334	283	315	270	290	642	463	260	275	214	392
CFSM	1.02	.70	.60	.56	.55	.56	3.27	2.25	.63	1.06	.54	1.13
IN.	1.18	.78	.69	.64	.58	.65	3.65	2.59	.70	1.22	.62	1.26

CAL YR 1981 TOTAL 264755 MEAN 725 MAX 4180 MIN 271 CFSM 1.21 IN 16.50
WTR YR 1982 TOTAL 233493 MEAN 640 MAX 5220 MIN 214 CFSM 1.07 IN 14.55

04062000 PAINT RIVER NEAR ALPHA, MI

LOCATION.--Lat 46°00'40", long 88°15'30", in NW¼ NW¼ sec.25, T.42 N., R.32 W., Iron County, Hydrologic Unit 04030106, on right bank 0.6 mi (1.0 km) downstream from Lower Paint Dam, 5.5 mi (8.8 km) upstream from Brule River, and 6.0 mi (9.7 km) southeast of Alpha.

DRAINAGE AREA.--631 mi² (1,634 km²).

PERIOD OF RECORD.--June 1952 to current year. Monthly discharge only for period October 1953 to September 1960, published in WSP 1727.

REVISED RECORDS.--WSP 1727: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,260 ft (384 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for period of no gage-height record, Oct. 2 to Nov. 30, which are fair. Flow completely regulated by powerplant and Lower Paint Dam, 0.6 mi (1.0 km) upstream. Records not adjusted for diversion to Michigamme River by Paint River diversion canal. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--30 years, 173 ft³/s (4.899 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,050 ft³/s (228 m³/s) July 2, 1953, gage height, 10.50 ft (3.200 m); minimum daily, 62 ft³/s (1.76 m³/s) Mar. 22, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,150 ft³/s (89.2 m³/s) Apr. 26, gage height, 7.62 ft (2.323 m); minimum daily, 84 ft³/s (2.38 m³/s) May 25, 26, 30, 31, July 8.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	90	150	88	90	98	90	120	859	85	86	95	89
2	90	150	88	90	96	92	126	833	85	86	95	90
3	90	150	88	90	94	92	125	418	86	87	96	90
4	90	150	88	90	92	92	125	89	86	88	96	89
5	90	150	88	90	90	92	125	88	86	101	97	93
6	90	145	88	92	90	90	126	346	86	99	97	93
7	90	145	88	92	90	90	120	1510	86	87	97	91
8	90	145	88	92	90	90	115	2500	86	84	97	90
9	90	145	88	92	90	90	112	2450	87	88	97	90
10	90	145	88	92	90	90	100	2390	86	92	97	90
11	90	145	90	92	88	90	98	2350	86	98	97	90
12	90	145	90	92	88	92	94	1720	86	93	98	90
13	90	125	90	94	88	94	94	608	86	93	99	91
14	90	90	90	94	88	96	94	355	87	110	100	91
15	90	90	90	94	88	98	93	908	86	93	100	91
16	125	90	90	94	88	98	95	893	86	97	103	93
17	160	90	90	94	88	98	126	536	87	95	104	93
18	160	90	90	94	88	98	376	601	88	375	102	90
19	160	90	90	94	88	96	336	596	88	650	100	89
20	155	90	90	94	88	94	316	596	88	402	107	91
21	155	90	90	96	88	92	392	591	88	93	103	93
22	155	90	90	96	88	92	644	359	88	93	100	93
23	155	90	90	96	88	92	638	85	88	93	104	91
24	150	90	90	96	88	94	794	85	88	93	99	91
25	150	90	90	96	88	96	1790	84	88	93	97	93
26	150	90	90	96	88	98	2650	84	88	93	127	94
27	150	90	90	96	88	100	2810	286	88	93	91	95
28	150	90	90	96	88	100	2210	372	88	94	89	93
29	150	90	90	98	---	105	1390	257	88	96	87	95
30	150	90	90	98	---	110	896	84	88	106	87	93
31	150	---	90	98	---	112	---	84	---	95	88	---
TOTAL	3775	3420	2770	2908	2504	2953	17130	23017	2607	4046	3046	2745
MEAN	122	114	89.4	93.8	89.4	95.3	571	742	86.9	131	98.3	91.5
MAX	160	150	90	98	98	112	2810	2500	88	650	127	95
MIN	90	90	88	90	88	90	93	84	85	84	87	89

CAL YR 1981 TOTAL 75071 MEAN 206 MAX 3030 MIN 83
WTR YR 1982 TOTAL 70921 MEAN 194 MAX 2810 MIN 84

04062230 MICHIGAMME RIVER NEAR MICHIGAMME, MI

LOCATION.--Lat 46°28'00", long 88°04'28", in SW¼ SW¼ sec.16, T.47 N., R.30 W., Marquette County, Hydrologic Unit 04030107, on right bank 20 ft (6 m) upstream from Northern Natural Gas Co. pipeline, 0.6 mi (1.0 km) upstream from Spruce River, 1.2 mi (1.9 km) downstream from Lake Michigamme, and 5.0 mi (8.0 km) southeast of Michigamme.

DRAINAGE AREA.--194 mi² (502 km²).

PERIOD OF RECORD.--October 1968 to September 1982 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 1,520 ft (463 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for period of no gage height record, Feb. 28 to Apr. 22, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--14 years, 288 ft³/s (8.156 m³/s), 20.16 in/yr (512 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,180 ft³/s (90.1 m³/s) Apr. 19, 1976, gage height, 7.77 ft (2.368 m); minimum, 2.8 ft³/s (0.079 m³/s) Sept. 30, 1976, gage height, 1.56 ft (0.475 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,220 ft³/s (62.9 m³/s) May 7, gage height, 6.82 ft (2.079 m); minimum, 64 ft³/s (1.81 m³/s) Oct. 1, gage height, 2.70 ft (0.823 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	66	305	145	125	97	76	140	2140	291	80	202	182
2	70	308	146	122	96	76	155	2160	279	74	206	183
3	83	306	147	125	96	76	200	2170	262	73	243	179
4	106	300	147	129	95	76	260	2140	249	74	288	171
5	135	293	145	128	93	75	270	2080	235	74	339	175
6	173	286	142	125	92	75	275	2110	217	73	395	182
7	209	275	141	123	90	75	280	2180	200	73	412	178
8	239	267	142	122	89	75	290	2180	190	71	410	173
9	259	255	142	122	88	74	290	2050	181	71	390	169
10	270	242	139	123	87	74	300	1900	186	71	363	171
11	272	234	137	124	87	76	305	1760	177	78	340	187
12	270	220	135	121	85	78	310	1610	173	93	320	218
13	262	210	134	118	83	80	320	1460	168	141	299	278
14	259	202	131	117	83	84	330	1330	160	197	283	335
15	259	195	129	114	82	88	340	1220	163	232	269	359
16	253	189	129	113	81	92	360	1110	154	268	256	372
17	253	184	128	112	81	96	400	1020	147	292	241	383
18	280	178	128	112	80	96	450	939	139	322	224	389
19	290	176	128	110	79	100	480	874	133	331	208	394
20	305	174	127	109	78	102	520	808	128	328	195	419
21	319	168	126	107	78	104	540	731	124	313	178	436
22	331	161	126	106	77	106	560	666	123	298	188	462
23	343	157	126	110	77	106	592	600	118	278	190	470
24	335	154	124	110	77	106	695	539	112	257	190	489
25	332	152	122	106	77	106	903	487	111	241	190	479
26	324	151	121	104	76	108	1240	447	102	222	193	464
27	318	153	120	102	76	108	1610	415	96	207	193	460
28	309	152	120	101	76	108	1880	385	94	193	185	443
29	301	147	119	100	---	110	2000	353	91	174	179	422
30	300	145	117	101	---	115	2070	329	85	184	181	417
31	301	---	122	100	---	130	---	308	---	189	175	---
TOTAL	7826	6339	4085	3541	2356	2851	18365	38501	4888	5572	7925	9639
MEAN	252	211	132	114	84.1	92.0	612	1242	163	180	256	321
MAX	343	308	147	129	97	130	2070	2180	291	331	412	489
MIN	66	145	117	100	76	74	140	308	85	71	175	169
CFSM	1.30	1.09	.68	.59	.43	.47	3.16	6.40	.84	.93	1.32	1.66
IN.	1.50	1.22	.78	.68	.45	.55	3.52	7.38	.94	1.07	1.52	1.85

CAL YR 1981 TOTAL 99411 MEAN 272 MAX 1440 MIN 60 CFSM 1.40 IN 19.06
WTR YR 1982 TOTAL 111888 MEAN 307 MAX 2180 MIN 66 CFSM 1.58 IN 21.45

04062500 MICHIGAMME RIVER NEAR CRYSTAL FALLS, MI

LOCATION.--Lat 46°06'50", long 88°12'57", in NW¼ sec.20, T.43 N., R.31 W., Iron County, Hydrologic Unit 04030107, on right bank 400 ft (122 m) upstream from highway bridge, 5.0 mi (8.0 km) downstream from Michigamme Reservoir, 6.0 mi (9.7 km) east of Crystal Falls and 15 mi (24 km) upstream from confluence with Brule River.

DRAINAGE AREA.--656 mi² (1,699 km²).

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,300 ft (396 m) from topographic map (nearest 10 ft).

REMARKS.--Records excellent. Flow regulated by powerplant and by Michigamme Reservoir, capacity, 119,950 acre-ft (148 hm³), 5 mi (8 km) upstream. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--38 years, 704 ft³/s (19.94 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,260 ft³/s (206 m³/s) Apr. 28, 1960, gage height, 10.73 ft (3.271 m); minimum daily, 71 ft³/s (2.01 m³/s) Nov. 26, 1950.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,580 ft³/s (130 m³/s) May 7, gage height, 8.70 ft (2.652 m); minimum, 98 ft³/s (2.78 m³/s) Mar. 25, Apr. 1; minimum gage height, 1.41 ft (0.430 m) Apr. 1; minimum daily discharge, 134 ft³/s (3.79 m³/s) Feb. 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	599	686	1150	788	573	692	280	1030	685	601	621	209
2	462	685	1150	503	951	625	161	1220	684	202	618	201
3	161	684	1150	500	1180	469	397	1190	681	171	618	199
4	155	683	1020	890	1170	419	314	1210	642	171	653	196
5	409	683	643	1180	1160	272	183	1230	609	157	686	215
6	599	683	642	1180	784	156	199	1580	606	148	686	492
7	596	683	863	1170	557	153	186	2910	609	149	686	632
8	593	681	1180	781	926	640	179	4420	606	509	683	621
9	441	679	1180	496	1150	524	182	4380	613	328	929	617
10	164	640	1190	492	1170	385	390	4350	618	186	1170	610
11	166	610	1030	901	1170	356	561	3440	614	202	1180	609
12	431	826	630	1190	790	280	567	2600	609	196	1170	607
13	591	1160	628	1180	528	145	572	2610	607	181	878	610
14	595	1150	928	1180	529	154	878	1880	606	170	601	609
15	597	1150	1180	779	909	663	1220	1520	611	172	601	614
16	596	1150	1170	475	1140	617	689	1510	607	607	939	614
17	601	1150	1170	548	1160	430	279	1360	605	1000	1190	621
18	649	1140	1030	545	1180	398	267	1670	605	1200	1180	620
19	482	1140	619	590	683	299	272	1700	603	1190	1170	628
20	159	1140	616	586	141	149	259	1660	603	1180	831	932
21	453	854	944	586	141	157	244	1680	604	1170	591	1180
22	655	653	1190	586	734	727	513	1420	607	1060	603	1170
23	682	652	1040	586	956	722	710	1200	602	647	632	843
24	678	653	612	584	523	480	771	1130	603	615	658	624
25	376	946	611	581	431	424	798	1120	486	613	656	621
26	460	1160	612	581	295	410	805	1100	177	616	662	623
27	688	1160	611	580	134	387	761	900	173	617	626	618
28	687	1160	940	577	154	396	620	685	435	617	593	618
29	686	1150	1180	578	---	413	445	685	606	623	603	625
30	688	1150	1180	575	---	460	714	685	602	632	598	666
31	688	---	1180	574	---	587	---	685	---	626	346	---
TOTAL	15787	26941	29269	22342	21219	12983	14416	54760	17318	16556	23658	18044
MEAN	509	898	944	721	758	419	481	1766	577	534	763	601
MAX	688	1160	1190	1190	1180	727	1220	4420	685	1200	1190	1180
MIN	155	610	611	475	134	145	161	685	173	148	346	196

CAL YR 1981 TOTAL 299503 MEAN 821 MAX 3440 MIN 135
WTR YR 1982 TOTAL 273293 MEAN 749 MAX 4420 MIN 134

04063000 MENOMINEE RIVER NEAR FLORENCE, WI

LOCATION.--Lat 45°57'04", long 88°11'13", in NE¼ sec.16, T.41 N., R.31 W., Michigan Meridian, Iron County, Hydrologic Unit 04030108, on left bank 0.5 mi (0.8 km) downstream from confluence of Brule and Michigamme Rivers, 3.5 mi (5.6 km) northeast of Florence, and at mile 117 (188 km).

DRAINAGE AREA.--1,780 mi² (4,610 km²).

PERIOD OF RECORD.--January 1914 to current year. Published as "at Twin Falls near Iron Mountain, MI" 1914-57. Records published for both sites July 1950 to September 1957.

REVISED RECORDS.--WSP 1707: 1953(M). WSP 1911: Drainage area of former site.

GAGE.--Water-stage recorder. Datum of gage is 1,119.23 ft (341.141 m) National Geodetic Vertical Datum of 1929 (levels by Owen Ayres Associates). Prior to July 1950, headwater and tailwater gages and generation data entered hourly in daily log sheets by company employees at the Twin Falls Powerplant of Wisconsin Electric Power Co., 10.4 mi (16.7 km) downstream.

REMARKS.--Records excellent. Prior to July 1950, discharge determined from powerplant records computed on basis of load-discharge rating of hydroelectric units and rating for tailwater gage during periods of spill. Rating developed by Geological Survey. Flow regulated by powerplants, Michigamme Reservoir, capacity, 119,950 acre-ft (148 hm³), and Peavy Pond, capacity, 33,860 acre-ft (41.7 hm³), on Michigamme River, and by many smaller reservoirs above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--68 years, 1,806 ft³/s (51.15 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 19,500 ft³/s (552 m³/s) Apr. 26, 1960, gage height, 14.15 ft (4.313 m); minimum, 38 ft³/s (1.08 m³/s) Aug. 21, 1962, Sept. 26, 1975; minimum gage height, 1.18 ft (0.360 m) Aug. 21, 1962, Nov. 4, 1965; minimum daily discharge, 57 ft³/s (1.61 m³/s) Sept. 26, 1975.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 9,220 ft³/s (261 m³/s) May 9, gage height, 9.21 ft (2.807 m); minimum, 130 ft³/s (3.68 m³/s) Nov. 7, gage height, 1.59 ft (0.485 m); minimum daily, 494 ft³/s (14.0 m³/s) July 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1570	1670	1850	1150	1460	1570	1750	3920	1530	1430	1440	1510
2	1600	1560	1870	1010	1710	1820	541	3650	1650	1430	1550	1530
3	1170	1730	1810	1350	1940	1700	855	3160	1550	494	1650	1420
4	1270	1740	1810	1920	1780	1550	1430	3020	1670	658	1440	1320
5	1400	2010	1720	1850	1860	1580	1960	2930	1130	728	1550	1970
6	1680	1030	1540	1890	1880	919	1850	3660	1010	858	1350	3160
7	1660	821	1650	1550	1490	889	1740	5550	1380	846	758	2340
8	1750	1200	1700	1750	1800	1360	1690	8850	1340	842	998	1690
9	1910	1590	1710	1330	1820	1420	1910	8850	1350	1110	1400	1830
10	1980	1530	1790	1450	2070	1450	1810	8490	1520	845	1390	1690
11	1960	1450	1670	1550	1990	1300	1890	7070	1650	3720	1250	1600
12	1600	1760	1460	1770	2010	1280	1970	5170	1420	3110	1250	1910
13	1800	1890	1440	1780	2100	880	2250	3990	1530	1870	1150	1660
14	1700	1810	1530	2010	2180	857	2120	3660	1610	2610	1050	1870
15	1590	1850	1870	1920	2030	1430	2550	3910	1850	2210	1490	1900
16	1790	2070	1870	1490	1880	1700	3030	3910	1400	3140	1650	2370
17	1820	1930	2010	1290	2050	1850	3800	3650	1350	3700	1740	2290
18	1760	1970	1890	1560	2200	1850	4050	3450	1350	3650	1710	2310
19	2190	1850	1550	1390	1910	1570	4130	3400	1050	3700	1800	2520
20	2290	1830	1400	1590	2010	674	4230	3410	1140	3290	789	2360
21	1890	1760	1540	1630	1980	671	3990	3480	1540	2670	951	2440
22	2220	1750	1790	1540	2090	1390	3890	3180	1590	2470	1540	2350
23	1890	1980	1660	1370	2050	1200	3950	2780	1460	2220	1520	1990
24	2060	2090	1320	1400	1850	1640	4110	2460	1290	1200	1720	1870
25	1860	1850	1430	1430	1980	1470	5270	2140	1350	967	808	1810
26	1330	1740	1230	1560	1730	1330	6570	1890	794	1540	1490	2080
27	1580	1720	1250	1090	917	672	6720	2010	749	1400	1520	1820
28	1750	1790	1550	1570	989	770	5750	2100	1340	1380	1180	1990
29	1480	1740	2050	1520	---	1350	4890	1510	1310	1500	1900	1850
30	1740	1950	2140	1080	---	1580	4370	1500	1270	1850	1500	2010
31	1370	---	1970	1080	---	1730	---	1420	---	1500	1650	---
TOTAL	53660	51661	52070	44870	51756	41542	95066	118170	41173	58938	43184	59460
MEAN	1731	1722	1680	1512	1848	1340	3169	3812	1372	1901	1393	1982
MAX	2290	2090	2140	2010	2200	1850	6720	8850	1850	3720	1900	3160
MIN	1170	821	1230	1010	917	671	541	1420	749	494	758	1320

CAL YR 1981 TOTAL 786302 MEAN 2154 MAX 10300 MIN 668
WTR YR 1982 TOTAL 713550 MEAN 1955 MAX 8850 MIN 494

04065393 EAST BRANCH STURGEON RIVER BELOW SKUNK CREEK, NEAR FELCH, MI

LOCATION.--Lat 46°01'34", long 87°49'56", in NW¼ NE¼ sec.20, T.42 N., R.28 W., Dickinson County, Hydrologic Unit 04030108, on right bank 50 ft (15 m) downstream from Skunk Creek, and 2.2 mi (3.5 km) north of Felch.

DRAINAGE AREA.--61.8 mi² (160.1 km²).

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1972, 1973. October 1973 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,067.53 ft (325.383 m) National Geodetic Vertical Datum of 1929. Prior to Dec. 20, 1973, nonrecording gage, and Dec. 20, 1973 to Sept. 30, 1980, water-stage recorder at present site at datum 2.00 ft (0.610 m) higher.

REMARKS.--Records good except those for the winter period, which are fair. Since June 1975, occasional regulation during low flows by Gene Lake Reservoir, usable capacity, 3,990 acre-ft (4.92 hm³) 3 mi (5 km) upstream. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--9 years, 54.2 ft³/s (1.535 m³/s), 11.91 in/yr (303 mm/yr), adjusted for initial storage.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 628 ft³/s (17.8 m³/s) Apr. 26, 1979, gage height, 6.28 ft (1.914 m), present datum; minimum, 3.4 ft³/s (0.096 m³/s) Sept. 7, 8, 9, 13, 1976, July 7, 1980.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 278 ft³/s (7.87 m³/s) Apr. 26, gage height, 5.58 ft (1.701 m); minimum, 6.4 ft³/s (0.18 m³/s) Aug. 21.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	27	32	25	15	15	15	63	124	32	21	51	30
2	36	30	25	15	15	15	66	112	29	22	45	41
3	32	28	24	15	15	15	85	102	26	23	40	47
4	31	27	23	15	15	15	127	91	23	23	38	40
5	34	27	22	15	16	15	117	84	22	22	35	48
6	40	28	22	15	16	15	113	104	20	20	31	87
7	44	28	21	15	16	15	108	152	19	18	28	91
8	42	27	20	15	16	15	95	170	19	16	26	85
9	40	26	18	15	16	15	86	158	18	14	24	74
10	37	25	17	14	16	15	84	153	28	16	26	63
11	35	26	16	15	16	15	81	156	26	102	21	57
12	34	26	15	15	16	15	85	145	22	188	17	52
13	32	26	15	15	16	15	97	134	21	179	15	51
14	34	24	15	15	16	16	109	131	24	146	15	70
15	43	24	15	15	16	17	141	118	51	143	14	94
16	42	24	14	15	16	18	179	102	55	150	12	103
17	41	23	14	15	16	18	233	90	48	149	11	101
18	54	24	14	15	16	18	249	88	42	129	9.1	98
19	57	24	14	15	16	18	262	88	37	106	9.4	92
20	54	25	14	15	17	18	232	84	33	84	7.5	105
21	52	25	14	16	17	19	189	74	32	66	6.6	110
22	49	23	14	16	17	20	178	64	33	52	9.1	102
23	46	21	14	16	17	21	169	57	28	44	12	89
24	42	22	14	16	17	23	189	51	24	36	10	84
25	40	23	14	16	16	24	231	46	30	31	9.9	90
26	39	23	14	16	16	24	272	41	30	27	12	88
27	38	26	15	16	16	25	261	37	27	26	19	81
28	37	26	15	16	16	28	215	35	24	25	19	70
29	36	25	15	16	---	33	172	33	26	23	20	64
30	35	25	15	15	---	43	144	32	24	56	30	66
31	33	---	15	15	---	56	---	31	---	61	29	---
TOTAL	1236	763	522	473	449	634	4632	2887	873	2018	651.6	2273
MEAN	39.9	25.4	16.8	15.3	16.0	20.5	154	93.1	29.1	65.1	21.0	75.8
MAX	57	32	25	16	17	56	272	170	55	188	51	110
MIN	27	21	14	14	15	15	63	31	18	14	6.6	30
CFSM	.65	.41	.27	.25	.26	.33	2.49	1.51	.47	1.05	.34	1.23
IN.	.74	.46	.31	.28	.27	.38	2.79	1.74	.53	1.21	.39	1.37

CAL YR 1981 TOTAL 18766.0 MEAN 51.4 MAX 421 MIN 12 CFSM .83 IN 11.30
WTR YR 1982 TOTAL 17411.6 MEAN 47.7 MAX 272 MIN 6.6 CFSM .77 IN 10.48

04065397 EAST BRANCH STURGEON RIVER AT HARDWOOD, MI

LOCATION.--Lat 45°57'55", long 87°41'53", in SW¼ NW¼ sec.9, T.41 N., R.27 W., Dickinson County, Hydrologic Unit 04030108, on right bank 10 ft (3 m) downstream from bridge on county highway, at Hardwood, 350 ft (107 m) upstream from Schultz Creek, and 9 mi (14 km) upstream from confluence with West Branch.

DRAINAGE AREA.--90.8 mi² (235.2 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1972-77. October 1977 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,030 ft (314 m) from topographic map (nearest 10 ft). Sept. 20, 1972 to Sept. 30, 1977, non-recording gage at site 1 mi (2 km) upstream at different datum. Oct. 1-20, 1977, non-recording gage at present site and datum.

REMARKS.--Water-discharge records good. Occasional regulation during low flows by Gene Lake Reservoir in headwaters (station 04065393) and Hardwood Reservoir 1.2 mi (1.9 km) upstream, combined usable capacity, 11,180 acre-ft (13.8 hm³).

AVERAGE DISCHARGE.--5 years, 82.8 ft³/s (2.345 m³/s), 12.38 in/yr (314 mm/yr), adjusted for initial storage.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 869 ft³/s (24.6 m³/s) Apr. 27, 1979, gage height, 8.44 ft (2.573 m); minimum, 3.4 ft³/s (0.096 m³/s) Aug. 14, 1980, gage height, 2.67 ft (0.814 m), result of unusual regulation at Hardwood Reservoir; minimum daily, 4.0 ft³/s (0.11 m³/s) Oct. 31, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 436 ft³/s (12.3 m³/s) Apr. 26, gage height, 6.68 ft (2.036 m); minimum, 11 ft³/s (0.31 m³/s) Sept. 4, 5, gage height, 2.93 ft (0.893 m); minimum daily, 11 ft³/s (0.31 m³/s) Sept. 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19	49	42	29	25	26	62	275	52	39	77	36
2	19	46	41	29	28	25	67	241	51	39	79	37
3	18	44	40	29	29	24	102	212	50	39	78	28
4	18	43	39	29	26	25	115	189	50	39	82	11
5	18	43	38	28	25	25	119	173	50	39	72	16
6	18	43	37	28	25	23	127	187	50	39	63	18
7	18	42	37	28	25	23	137	199	50	38	55	27
8	18	41	36	27	25	23	148	217	50	38	49	55
9	18	39	32	27	25	24	155	234	51	38	45	79
10	19	38	32	26	25	24	156	259	52	38	41	90
11	23	37	32	26	25	24	150	265	46	90	39	90
12	28	35	30	26	25	25	153	253	39	161	37	83
13	31	35	29	26	25	29	163	286	39	224	37	89
14	37	36	30	26	25	28	168	275	39	290	37	138
15	46	36	30	26	25	28	196	253	41	300	37	152
16	48	35	29	26	25	29	240	225	40	316	37	155
17	54	35	28	26	25	30	313	199	40	284	36	164
18	73	34	27	26	25	30	362	186	39	256	36	170
19	74	34	27	26	25	31	403	157	39	220	36	169
20	79	37	26	26	25	31	417	141	39	185	36	194
21	78	35	26	26	25	33	382	127	39	154	35	178
22	76	33	26	26	25	34	352	116	39	126	36	166
23	72	32	26	26	25	46	336	104	39	100	36	158
24	66	31	26	26	25	57	342	92	39	80	36	172
25	63	33	26	26	25	53	386	83	42	68	36	168
26	60	37	26	26	25	51	427	75	39	57	36	150
27	57	43	26	26	25	50	427	68	39	51	36	139
28	54	43	26	26	25	50	400	63	39	46	35	128
29	52	42	26	26	---	51	365	59	39	44	36	119
30	51	40	27	26	---	53	319	56	39	64	37	116
31	50	---	28	25	---	58	---	54	---	70	36	---
TOTAL	1355	1151	951	825	708	1063	7489	5323	1300	3572	1404	3295
MEAN	43.7	38.4	30.7	26.6	25.3	34.3	250	172	43.3	115	45.3	110
MAX	79	49	42	29	29	58	427	286	52	316	82	194
MIN	18	31	26	25	25	23	62	54	39	38	35	11
CFSM	.48	.42	.34	.29	.28	.38	2.75	1.89	.48	1.27	.50	1.21
IN.	.56	.47	.39	.34	.29	.44	3.07	2.18	.53	1.46	.58	1.35

CAL YR 1981 TOTAL 28769 MEAN 78.8 MAX 450 MIN 16 CFSM .87 IN 11.79
WTR YR 1982 TOTAL 28436 MEAN 77.9 MAX 427 MIN 11 CFSM .86 IN 11.65

04065397 EAST BRANCH STURGEON RIVER AT HARDWOOD, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: December 1977 to current year.

INSTRUMENTATION.--Water-quality monitor since December 1977.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument. Intermittent ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum recorded (water years 1978-81), 28.0°C July 11, 12, 1979; minimum, 0.0°C on many days during winter periods.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	11.0	9.5	10.5	---	---	---	2.5	2.0	2.0	2.0	.5	1.5
2	12.5	9.0	10.0	---	---	---	3.0	2.0	2.5	2.0	.5	1.5
3	12.5	8.0	10.0	---	---	---	3.0	2.0	2.5	2.5	2.0	2.0
4	10.0	9.5	10.0	---	---	---	3.0	2.0	2.5	2.0	1.0	1.5
5	11.5	10.0	10.5	---	---	---	3.0	2.0	2.0	2.5	1.0	2.0
6	11.5	9.5	10.5	---	---	---	2.5	2.0	2.5	2.0	1.0	1.5
7	12.0	8.5	10.0	---	---	---	2.5	2.0	2.5	1.5	.5	1.0
8	12.0	8.0	9.5	---	---	---	2.5	2.0	2.0	1.5	.5	1.0
9	11.5	8.5	9.5	---	---	---	2.5	1.5	2.0	1.5	.0	.5
10	10.5	9.5	10.0	---	---	---	3.0	2.0	2.0	.5	.0	.5
11	11.5	10.0	10.5	---	---	---	3.0	1.5	2.0	2.0	.5	1.5
12	12.0	8.5	10.0	---	---	---	3.0	2.0	2.5	2.5	1.0	2.0
13	12.0	9.0	10.0	4.5	2.5	3.5	3.5	2.5	2.5	2.5	1.0	1.5
14	11.0	10.5	10.5	4.5	2.5	3.5	3.0	2.0	2.5	2.5	.5	1.5
15	11.0	9.0	10.5	5.0	3.5	4.0	3.5	1.5	2.0	2.0	.5	1.5
16	---	---	---	5.0	3.5	4.0	3.0	1.5	2.0	1.5	.0	.5
17	---	---	---	4.5	3.5	4.0	2.5	1.5	1.5	.5	.0	.0
18	---	---	---	4.0	3.5	3.5	2.5	1.5	2.0	2.0	.5	1.0
19	---	---	---	3.5	2.0	3.0	2.5	1.0	1.5	2.5	.5	1.5
20	---	---	---	3.0	2.0	2.5	2.0	.5	1.5	2.0	.5	1.0
21	---	---	---	2.0	1.5	2.0	3.0	1.5	2.0	2.0	.0	1.0
22	---	---	---	2.0	.5	1.5	3.0	2.0	2.5	1.5	.0	.5
23	---	---	---	2.5	.5	1.5	2.0	2.0	2.0	2.0	.0	1.0
24	---	---	---	2.5	1.0	1.5	2.0	1.0	1.5	1.5	.0	.5
25	---	---	---	2.0	1.5	2.0	2.5	1.0	1.5	1.5	.0	.5
26	---	---	---	2.0	1.5	2.0	2.5	1.5	2.0	1.5	.0	.5
27	---	---	---	2.0	2.0	2.0	3.0	2.0	2.5	2.5	1.0	1.5
28	---	---	---	2.0	2.0	2.0	2.5	1.0	2.0	2.0	.5	1.5
29	---	---	---	2.5	2.0	2.0	2.0	.5	1.5	1.5	.0	1.0
30	---	---	---	2.5	1.5	2.0	2.0	1.0	1.5	2.0	.0	1.5
31	---	---	---	---	---	---	2.5	1.0	2.0	2.0	.0	1.0
MONTH							3.5	.5	2.0	2.5	.0	1.0

04065397 EAST BRANCH STURGEON RIVER AT HARDWOOD, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	2.0	.0	1.0				---	---	---	12.0	7.5	10.0
2	2.5	1.0	1.5				2.0	2.0	2.0	12.5	11.0	12.0
3	2.0	.5	1.5				2.5	1.0	1.5	12.5	11.0	11.5
4	1.5	.0	.5				2.5	1.5	2.0	12.5	10.0	11.0
5	2.0	.5	1.0				2.5	1.5	2.0	11.5	9.5	11.0
6	1.5	.0	.5				2.5	1.5	2.0	11.5	11.0	11.5
7	2.5	1.0	1.5				2.5	1.5	2.0	11.5	10.0	11.0
8	2.0	.5	1.0				2.5	1.5	2.0	13.0	11.5	12.0
9	2.0	.0	.5				2.5	1.5	2.0	12.5	11.5	12.0
10	1.5	.0	.5				2.0	1.5	1.5	12.5	11.5	12.0
11	3.0	.5	1.5				2.0	1.5	1.5	13.0	12.0	12.5
12	2.5	.0	1.0				2.0	1.5	1.5	14.5	13.0	13.5
13	2.0	.5	1.0				2.0	1.5	1.5	14.5	13.0	13.5
14	2.5	.5	1.5				2.5	1.5	2.0	16.0	13.5	15.0
15	3.0	1.5	2.0				2.0	1.5	1.5	16.5	14.5	15.5
16	4.5	.5	2.0				1.5	1.0	1.5	17.0	15.5	16.5
17	4.0	1.0	2.0				1.5	1.0	1.0	16.0	15.5	16.0
18	3.5	1.5	2.0				2.0	1.0	1.5	16.0	14.5	15.5
19	4.0	1.5	2.5				1.5	1.0	1.0	16.0	15.0	15.5
20	4.5	2.0	2.5				1.5	1.0	1.0	15.5	14.0	15.0
21	2.5	1.5	2.0				2.0	1.0	1.0	16.5	14.0	15.0
22	---	---	---				2.0	1.0	1.5	16.5	14.5	15.0
23	---	---	---				2.5	1.5	2.0	17.5	14.5	15.5
24	---	---	---				2.5	2.0	2.5	17.5	14.0	15.5
25	---	---	---				3.0	2.5	2.5	16.5	14.0	15.0
26	---	---	---				4.0	2.5	3.5	17.5	14.0	15.5
27	---	---	---				5.5	4.0	5.0	16.0	14.5	15.0
28	---	---	---				7.5	5.0	5.5	16.5	14.5	15.5
29	---	---	---				8.5	6.5	7.0	15.0	14.5	14.5
30	---	---	---				9.0	7.5	8.0	16.5	14.0	15.0
31	---	---	---				---	---	---	15.5	13.5	14.5
MONTH										17.5	7.5	14.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	16.0	13.5	14.5	19.5	15.0	17.0	21.5	20.5	21.0			
2	17.0	13.5	14.5	20.0	15.5	17.0	22.0	20.0	20.5			
3	18.0	14.0	15.5	17.5	16.0	16.5	21.5	20.5	21.0			
4	18.0	14.0	15.5	18.0	16.0	17.0	22.0	20.5	21.0			
5	18.5	14.0	15.5	21.0	16.0	17.5	22.5	20.5	21.0			
6	17.5	14.0	15.5	20.0	17.0	18.0	23.5	20.5	21.5			
7	18.5	14.5	16.0	21.0	17.0	18.0	23.5	20.5	21.5			
8	18.0	14.5	16.0	21.5	16.0	18.0	22.0	19.5	20.5			
9	17.0	15.0	15.5	21.0	17.0	18.5	20.0	18.5	19.0			
10	17.5	15.0	16.0	20.5	17.5	18.5	21.0	18.0	19.0			
11	---	---	---	18.5	16.5	17.5	21.5	17.5	19.0			
12	---	---	---	22.0	18.5	20.0	22.5	17.5	19.0			
13	---	---	---	21.5	20.0	21.0	21.5	17.5	19.0			
14	---	---	---	22.5	20.5	21.5	21.0	18.5	19.5			
15	---	---	---	23.0	21.5	22.0	22.0	18.0	19.5			
16	---	---	---	22.0	21.0	21.5	22.5	18.0	19.5			
17	---	---	---	22.0	21.0	21.5	22.0	17.5	19.0			
18	---	---	---	23.0	21.0	22.0	21.5	17.5	19.0			
19	---	---	---	24.5	22.0	23.5	22.0	18.5	19.5			
20	---	---	---	24.0	22.0	23.0	21.5	17.5	19.0			
21	---	---	---	23.5	21.5	22.5	21.0	17.5	19.0			
22	---	---	---	24.5	22.5	23.0	21.0	18.0	19.0			
23	---	---	---	24.5	21.5	23.0	20.5	17.5	18.5			
24	---	---	---	23.0	21.0	22.0	19.0	17.5	18.0			
25	---	---	---	24.0	21.0	22.0	21.5	17.5	19.0			
26	---	---	---	21.0	20.5	21.0	18.5	18.0	18.5			
27	---	---	---	23.5	20.0	21.5	20.0	17.0	18.0			
28	---	---	---	23.5	19.5	21.0	20.0	16.0	17.5			
29	---	---	---	22.0	19.0	20.0	16.5	16.0	16.0			
30	---	---	---	21.0	20.0	20.5	19.0	16.5	17.0			
31	---	---	---	22.5	20.0	21.0	17.5	16.0	16.5			
MONTH				24.5	15.0	20.0	23.5	16.0	19.0			

04067500 MENOMINEE RIVER NEAR McALLISTER, WI
(National stream-quality accounting network station)

LOCATION.--Lat 45°19'33", long 87°39'48", in SW¼ SE¼ sec.17, T.33 N., R.23 E., Marinette County, Hydrologic Unit 04030108, on right bank 85 ft (26 m) downstream from bridge on County Highway JJ, 2.9 mi (4.7 km) downstream from Grand Rapids Dam, 2.6 mi (4.2 km) east of McAllister, 1.9 mi (3.1 km) downstream from Little Cedar River, and at mile 22.6 (36.4 km).

DRAINAGE AREA.--3,930 mi² (10,200 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1945 to September 1961; October 1961 to September 1979, miscellaneous measurements and peaks only; October 1979 to current year.

REVISED RECORDS.--WDR WI-80-1: Drainage area.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 622.20 ft (189.647 m) National Geodetic Vertical Datum of 1929 (Michigan Department of Transportation reference mark). Prior to May 15, 1945, nonrecording gage 1,400 ft (427 m) downstream at same datum; May 16, 1945, to September 1961, water-stage recorder 1,000 ft (305 m) downstream at same datum; October 1961 to September 1979, crest-stage gage 1,100 ft (335 m) downstream at same datum.

REMARKS.--Records good except those for winter period, which are fair. Flow regulated by powerplants, by Michigamme Reservoir, capacity, 119,950 acre-ft (148 hm³), and Peavy Pond, capacity, 33,860 acre-ft (41.7 hm³) on the Michigamme River, and by many smaller reservoirs above station.

AVERAGE DISCHARGE.--19 years (water years 1946-61, 1980-82), 3,437 ft³/s (97.34 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 32,500 ft³/s (920 m³/s) May 9, 1960, gage height, 20.0 ft (6.096 m), from graph based on gage readings; minimum observed, 538 ft³/s (15.2 m³/s) Oct. 6, 1946, gage height, 7.29 ft (2.222 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 12,700 ft³/s (360 m³/s) May 10, gage height, 14.89 ft (4.538 m); minimum daily 1,540 ft³/s (43.6 m³/s) Aug. 16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2060	2900	3030	2600	1600	1900	4000	8640	2510	2300	2830	2710
2	2940	2660	3080	2300	1900	2100	5000	7560	2610	2320	2830	3140
3	2880	2660	2780	1900	2000	2300	5400	6640	2640	1970	2950	3190
4	2870	2770	2720	1700	2200	2500	5200	6030	2610	1730	3170	3020
5	2970	2710	2830	2000	2300	2300	4600	5900	2370	1570	3030	2980
6	2530	2670	2970	2400	2300	2100	5800	6110	2290	1660	2850	4140
7	3130	2740	2830	2500	2300	1800	5800	6480	2120	1680	2820	5040
8	2850	2410	2440	2500	2200	1700	5400	8510	2010	1770	2790	5110
9	3370	1760	2600	2200	2100	1900	5200	11200	2040	1940	2120	3340
10	3200	2210	2330	2000	2100	2000	5200	12500	2210	1760	1840	3100
11	3110	2650	2300	1900	2400	1900	5200	12300	2470	3660	2280	3620
12	3190	2670	2300	2100	2500	2200	5600	11400	2190	7790	2440	3210
13	3320	2440	2400	2300	2500	1900	6400	8990	2450	9510	2430	3200
14	3060	2560	2400	2400	2400	1900	6400	7640	2680	8350	2270	3130
15	2750	2650	2200	2400	2500	1800	6800	6380	2890	7700	2050	4040
16	3060	2770	2100	2400	2500	1900	7400	6980	3080	7410	1540	5220
17	3050	2960	2300	2300	2600	2100	8600	6660	3350	8630	1930	5060
18	3220	2770	2400	2000	2500	2600	10000	6460	3050	9180	2110	5490
19	3760	2840	2400	2000	2600	2700	10000	5940	2540	8760	2710	5250
20	4530	2710	2300	1900	2500	2400	10000	5770	2170	7830	2430	5280
21	4030	2820	2000	2000	2500	1900	10000	5790	2230	6470	2050	5300
22	3460	2660	2200	2000	2500	2000	9400	5580	2740	5430	1820	4840
23	3240	2810	2300	2100	2700	2100	8800	5510	2960	4860	1670	4780
24	3360	2670	2300	2100	2700	2200	8200	4510	2600	4370	2080	4040
25	3410	2800	2100	2000	2700	2200	8800	3950	2830	3340	2110	4100
26	3260	3110	2000	2000	2600	2400	9540	3740	2140	2110	2410	4230
27	3190	2820	2000	2100	2400	2500	11100	2950	2050	2610	2500	4280
28	2890	3090	2200	1900	2100	2200	12100	3190	1900	2800	2750	4270
29	2530	2820	2200	1800	---	2100	11200	3210	1960	2930	2780	3860
30	2740	2920	2200	1800	---	2400	9370	3000	2300	2720	2940	3790
31	2810	---	2400	1700	---	3000	---	3020	---	2970	3010	---
TOTAL	96770	81030	74610	65300	66200	67000	226510	202540	73990	138130	75540	122760
MEAN	3122	2701	2407	2106	2364	2161	7550	6534	2466	4456	2437	4092
MAX	4530	3110	3080	2600	2700	3000	12100	12500	3350	9510	3170	5490
MIN	2060	1760	2000	1700	1600	1700	4000	2950	1900	1570	1540	2710

CAL YR 1981 TOTAL 1393280 MEAN 3817 MAX 19400 MIN 1420
WTR YR 1982 TOTAL 1290380 MEAN 3535 MAX 12500 MIN 1540

04067500 MENOMINEE RIVER NEAR McALLISTER, WI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--December 1977 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV												
11...	1330	2590	210	7.6	4.0	12.0	95	K5	K10	110	8.0	24
JAN												
20...	1330	2200	240	7.7	.0	--	--	K10	K9	110	14	25
MAY												
20...	1040	5810	135	--	17.0	8.7	93	K4	150	70	6.0	16
JUL												
20...	1430	7780	180	7.7	22.0	8.3	98	33	50	95	8.0	22
AUG												
18...	0945	2180	200	8.0	23.5	8.5	104	K16	29	96	5.0	22

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
NOV												
11...	11	2.1	4	.5	97	12	2.9	<.1	7.8	140	119	.19
JAN												
20...	12	2.4	4	1.2	98	14	3.0	<.1	10	158	127	.21
MAY												
20...	7.2	2.0	6	.7	64	8.0	2.0	<.1	5.7	76	80	.10
JUL												
20...	9.7	2.5	5	.6	87	7.0	2.6	.1	8.4	160	105	.22
AUG												
18...	10	2.7	6	.7	91	11	2.7	.1	7.6	118	112	.16

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV												
11...	979	.11	<.010	.01	.46	.020	.06	.010	<.010	3	21	78
JAN												
20...	939	.23	.030	.04	.23	.010	.03	.020	.010	1	5.9	100
MAY												
20...	1190	.16	.050	.06	.71	.030	.09	.020	<.010	8	125	72
JUL												
20...	3360	<.10	.080	.10	.80	.040	.12	.020	<.010	10	210	65
AUG												
18...	695	<.10	.050	.06	1.80	.020	.06	.010	.040	3	18	78

STREAMS TRIBUTARY TO LAKE MICHIGAN

04067500 MENOMINEE RIVER NEAR MCALLISTER, WI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
NOV										
11...	1330	1	[illegible]	<100	12	<1	1	20	<10	<1
MAY										
20...	1040	1	1	<100	28	1	--	10	<10	3
JUL										
20...	1430	2	1	100	30	2	--	<10	<10	1
AUG										
18...	0945	2	[illegible]	<100	15	2	<1	10	10	2

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
NOV										
11...	<1	6	<1	320	100	3	1	40	11	.1
MAY										
20...	2	5	[illegible]	410	130	16	6	80	16	<.1
JUL										
20...	1	7	[illegible]	530	160	5	<1	100	16	.2
AUG										
18...	2	14	10	210	48	2	<1	60	10	<.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
NOV									
11...	<.1	<1	<1	<1	<1	<1	<1	40	8
MAY									
20...	<.1	2	2	<1	<1	<1	<1	10	29
JUL									
20...	.1	2	2	<1	<1	<1	<1	30	18
AUG									
18...	<.1	4	1	<1	<1	<1	<1	60	11

04096400 ST. JOSEPH RIVER NEAR BURLINGTON, MI

LOCATION.--Lat 42°06'10", long 85°02'25", in SW¼ SW¼ sec.20, T.4 S., R.6 W., Calhoun County, Hydrologic Unit 04050001, on right bank 10 ft (3 m) upstream from bridge on 13 Mile Rd., 2.0 mi (3.2 km) east of Burlington, 4.0 mi (6.4 km) downstream from Tekonsha Creek, and at mile 164 (264 km).

DRAINAGE AREA.--201 mi² (521 km²).

PERIOD OF RECORD.--October 1962 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 920 ft (280 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years, 171 ft³/s (4.843 m³/s), 11.55 in/yr (293 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,340 ft³/s (37.9 m³/s), Mar. 21, 1982, gage height, 5.78 ft (1.762 m); minimum, 8.0 ft³/s (0.23 m³/s) Aug. 9, 10, 11, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,340 ft³/s (37.9 m³/s) Mar. 21, gage height, 5.78 ft (1.762 m); minimum, 56 ft³/s (1.59 m³/s) Sept. 13, 14, gage height, 1.76 ft (0.536 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	476	234	203	160	155	198	820	300	458	219	115	70
2	462	226	202	198	150	193	750	288	441	205	112	70
3	402	217	197	166	150	189	745	277	411	209	107	68
4	396	209	197	215	150	170	740	266	411	200	107	65
5	396	202	197	246	150	160	725	256	417	187	106	63
6	396	195	197	248	150	160	725	248	427	178	106	63
7	382	189	195	251	155	165	695	248	417	166	105	63
8	360	184	193	243	160	165	685	253	405	153	103	64
9	332	178	187	231	160	170	665	251	357	139	106	63
10	304	172	178	200	160	175	646	254	330	135	108	62
11	277	165	160	190	155	190	630	253	300	154	105	60
12	256	158	175	180	155	251	614	246	286	148	101	58
13	238	148	166	170	150	442	610	239	278	139	99	57
14	224	142	162	165	150	695	590	229	270	130	95	57
15	214	138	159	160	150	755	566	217	263	121	93	61
16	203	138	154	155	150	860	550	215	246	116	89	63
17	197	136	151	150	155	1120	554	203	232	153	87	66
18	219	135	145	145	160	1220	550	193	229	163	84	81
19	231	136	138	145	165	1280	538	189	236	154	83	86
20	226	165	135	147	168	1310	534	180	231	166	88	86
21	224	192	130	147	175	1330	518	203	234	171	100	78
22	220	205	142	150	192	1250	502	236	236	160	107	80
23	226	214	145	150	210	1160	479	271	236	150	99	78
24	222	215	151	150	209	1090	444	284	234	139	90	75
25	217	215	150	150	205	1010	411	302	229	127	88	79
26	215	217	150	155	195	940	385	322	222	116	84	78
27	222	226	150	155	193	870	365	355	205	110	82	105
28	249	220	153	155	200	815	342	408	210	187	78	155
29	246	212	151	160	---	775	326	396	232	174	75	147
30	244	207	150	160	---	750	312	365	231	145	72	123
31	239	---	150	160	---	835	---	352	---	124	71	---
TOTAL	8724	5590	5113	5457	4677	20713	17016	8299	8914	4838	2945	2324
MEAN	281	186	165	176	167	668	567	268	297	156	95.0	77.5
MAX	476	234	203	251	210	1330	820	408	458	219	115	155
MIN	197	135	130	145	150	160	312	180	205	110	71	57
CFSM	1.40	.93	.82	.88	.83	3.32	2.82	1.33	1.48	.78	.47	.39
IN.	1.61	1.03	.95	1.01	.87	3.83	3.15	1.54	1.65	.90	.55	.43

CAL YR 1981 TOTAL 94193 MEAN 258 MAX 705 MIN 98 CFSM 1.28 IN 17.43
WTR YR 1982 TOTAL 94610 MEAN 259 MAX 1330 MIN 57 CFSM 1.29 IN 17.51

STREAMS TRIBUTARY TO LAKE MICHIGAN

04096515 HOG CREEK NEAR ALLEN, MI

LOCATION.--Lat 41°56'55", long 84°49'40", in NE¼ SE¼ sec.13, T.6 S., R.5 W., Branch County, Hydrologic Unit 04050001, on left bank 12 ft (4 m) downstream from bridge on U.S. Highway 12, 1.0 mi (1.6 km) downstream from Little Hog Creek, and 3.1 mi (5.0 km) west of Allen.

DRAINAGE AREA.--48.7 mi² (126.1 km²).

PERIOD OF RECORD.--October 1969 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,010 ft (308 m) from topographic map. Prior to May 23, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--13 years, 43.3 ft³/s (1.226 m³/s), 12.07 in/yr (307 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 524 ft³/s (14.8 m³/s) Mar. 17, 1982, gage height, 5.63 ft (1.716 m); maximum gage height, 5.78 ft (1.762 m) June 28, 1978; minimum discharge, 1.2 ft³/s (0.034 m³/s) Aug. 20, 21, 1971; minimum gage height, 1.33 ft (0.405 m) Sept. 30, Oct. 1, 1979.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 524 ft³/s (14.8 m³/s) Mar. 17, gage height, 5.63 ft (1.716 m); minimum, 5.3 ft³/s (0.150 m³/s) Sept. 6, 7, gage height, 1.41 ft (0.430 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	83	49	49	33	32	40	197	56	150	35	13	7.7
2	93	46	49	34	31	40	186	53	180	31	13	7.7
3	88	43	47	36	31	41	175	50	175	36	13	7.1
4	78	41	46	41	30	41	174	48	150	43	14	6.8
5	69	40	48	70	30	41	165	45	126	39	14	6.6
6	62	39	49	65	30	40	157	43	107	34	14	5.9
7	56	38	47	57	31	40	157	50	93	30	13	6.6
8	52	36	47	51	31	39	130	66	81	27	16	7.7
9	48	34	45	46	32	40	123	62	73	25	16	6.8
10	44	33	41	42	32	27	122	55	76	24	11	6.6
11	42	31	42	39	31	38	122	49	78	26	11	6.3
12	39	30	34	37	31	62	120	45	71	27	12	6.3
13	37	29	33	35	31	136	118	41	62	23	11	6.1
14	36	28	33	34	31	262	117	38	54	22	11	6.2
15	35	28	32	33	30	410	113	35	50	21	11	7.6
16	34	27	31	32	31	435	108	39	62	20	10	7.4
17	33	27	29	31	32	493	129	60	63	22	9.7	7.3
18	37	26	29	30	33	518	146	47	55	22	8.9	14
19	42	27	28	29	34	472	141	39	53	25	8.7	10
20	40	46	28	30	34	446	131	35	56	32	14	8.2
21	38	70	28	30	35	449	121	78	58	25	14	7.6
22	38	71	29	30	37	421	109	111	60	22	11	8.6
23	42	65	29	31	39	376	97	115	56	20	11	8.5
24	44	59	30	31	40	340	88	128	50	19	10	7.7
25	42	56	31	31	39	308	81	120	44	19	10	7.6
26	39	53	31	31	38	272	77	102	40	18	9.2	7.4
27	43	57	31	31	38	243	72	93	37	17	9.2	19
28	58	59	31	32	39	205	67	113	35	16	8.7	20
29	61	56	31	32	---	183	62	146	41	15	8.0	13
30	58	51	31	32	---	172	58	140	41	14	7.7	11
31	53	---	32	32	---	186	---	123	---	14	7.7	---
TOTAL	1564	1295	1121	1148	933	6816	3663	2225	2277	763	350.8	259.3
MEAN	50.5	43.2	36.2	37.0	33.3	220	122	71.8	75.9	24.6	11.3	8.64
MAX	93	71	49	70	40	518	197	146	180	43	16	20
MIN	33	26	28	29	30	27	58	35	35	14	7.7	5.9
CFSM	1.04	.89	.74	.76	.68	4.52	2.51	1.47	1.56	.51	.23	.18
IN.	1.19	.99	.86	.88	.71	5.21	2.80	1.70	1.74	.58	.27	.20

CAL YR 1981 TOTAL 22897.0 MEAN 62.7 MAX 299 MIN 18 CFSM 1.29 IN 17.49
WTR YR 1982 TOTAL 22415.1 MEAN 61.4 MAX 518 MIN 5.9 CFSM 1.26 IN 17.12

04096600 COLDWATER RIVER NEAR HODUNK, MI

LOCATION.--Lat 42°01'45", long 85°06'25", in NW¼ NE¼ sec.22, T.5 S., R.7 W., Branch County, Hydrologic Unit 04050001, on downstream side of bridge on Girard Rd., 2.5 mi (4.0 km) northwest of Hodunk, and 3.5 mi (5.6 km) upstream from mouth.

DRAINAGE AREA.--293 mi² (759 km²).

PERIOD OF RECORD.--October 1962 to current year.

REVISED RECORDS.--WDR MI-76-1: 1974.

GAGE.--Water-stage recorder. Altitude of gage is 900 ft (274 m) from topographic map (nearest 10 ft). Prior to July 26, 1963, non-recording gage and crest-stage gage at same site and datum.

REMARKS.--Records good except those for period of no gage-height record, Jan. 11 to Mar. 1, which are fair. Diurnal fluctuation caused by mills above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years, 249 ft³/s (7.052 m³/s), 11.54 in/yr (293 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,260 ft³/s (64.0 m³/s) Mar. 18, 1982, gage height, 8.25 ft (2.515 m); minimum, 6.2 ft³/s (0.18 m³/s) Sept. 26, 1964; minimum gage height, 2.28 ft (0.695 m) Oct. 4-14, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,260 ft³/s (64.0 m³/s) Mar. 18, gage height, 8.25 ft (2.515 m); minimum, 52 ft³/s (1.47 m³/s) Sept. 12, 13, 14, gage height, 2.83 ft (0.863 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	545	363	275	207	225	255	1550	405	603	284	92	68
2	704	348	273	199	220	242	1450	407	660	266	92	66
3	650	335	270	213	215	231	1390	405	697	273	92	64
4	555	324	268	241	215	211	1330	408	667	281	89	61
5	497	314	270	281	215	230	1290	403	627	281	88	59
6	451	302	274	317	220	244	1190	394	577	278	86	58
7	414	298	272	333	230	238	1140	394	532	251	83	59
8	389	291	265	315	230	230	1130	412	484	200	101	59
9	367	279	263	305	230	226	1090	414	455	145	108	58
10	345	273	250	300	230	227	1060	395	430	147	96	56
11	326	264	231	280	225	243	1050	321	410	166	88	55
12	313	255	239	270	220	317	1030	242	367	173	82	54
13	300	248	234	260	220	659	1010	246	312	176	81	53
14	292	247	230	250	220	1230	997	245	301	173	77	53
15	284	242	226	240	220	1880	951	248	296	173	75	54
16	283	235	222	230	225	2050	909	254	293	173	73	54
17	291	229	218	225	230	2170	897	259	300	243	69	55
18	302	226	205	220	235	2240	931	268	299	318	66	65
19	317	227	199	220	240	2150	935	256	298	295	65	68
20	324	251	202	215	250	2000	910	240	300	289	87	65
21	320	292	186	210	260	2070	884	271	305	236	95	61
22	323	319	210	210	270	2020	848	358	301	152	85	61
23	329	319	208	210	280	1930	806	458	288	147	79	63
24	331	308	198	210	280	1870	765	491	278	139	76	64
25	322	297	204	220	280	1780	711	519	266	133	78	64
26	311	292	210	230	280	1680	665	602	262	127	75	64
27	318	288	208	230	270	1570	623	568	256	117	72	84
28	362	290	208	230	260	1470	520	554	275	121	71	112
29	405	285	205	230	---	1390	392	563	313	110	70	105
30	398	279	193	230	---	1340	400	551	308	101	69	90
31	386	---	203	230	---	1430	---	524	---	95	68	---
TOTAL	11748	8520	7119	7561	6695	35913	28854	12075	11760	6063	2528	1952
MEAN	379	284	230	244	239	1158	962	390	392	196	81.5	65.1
MAX	704	363	275	333	280	2240	1550	602	697	318	108	112
MIN	283	226	186	199	215	211	392	240	256	95	65	53
CFSM	1.29	.97	.79	.83	.82	3.95	3.28	1.33	1.34	.67	.28	.22
IN.	1.49	1.08	.90	.96	.85	4.56	3.66	1.53	1.49	.77	.32	.25

CAL YR 1981 TOTAL 144846 MEAN 397 MAX 1710 MIN 135 CFSM 1.36 IN 18.39
WTR YR 1982 TOTAL 140788 MEAN 386 MAX 2240 MIN 53 CFSM 1.32 IN 17.87

04096900 NOTTAWA CREEK NEAR ATHENS, MI

LOCATION.--Lat 42°03'20", long 85°18'30", in NW¼ sec.12, T.5 S., R.9 W., St. Joseph County, Hydrologic Unit 04050001, on right bank at downstream side of bridge on Shorts Road, 4.2 mi (6.8 km) southwest of Athens, and 5.0 mi (8.0 km) downstream from Pine Creek.

DRAINAGE AREA.--162 mi² (420 km²).

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft (259 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--16 years, 145 ft³/s (4.106 m³/s), 12.15 in/yr (309 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,120 ft³/s (31.7 m³/s) June 29, 1978, gage height, 6.47 ft (1.972 m); minimum, 21 ft³/s (0.59 m³/s) July 28, 29, 30, Aug. 4, 6, 1977; minimum gage height, 0.37 ft (0.113 m) Oct. 16, 18, 20, 21, Nov. 8, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 900 ft³/s (25.5 m³/s) Mar. 18, gage height, 5.02 ft (1.530 m); minimum, 61 ft³/s (1.73 m³/s) Sept. 14, 15, 16, 17; gage height, 1.14 ft (0.347 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	253	135	146	80	105	124	532	167	367	137	93	79
2	300	127	140	83	105	124	543	165	474	129	92	78
3	296	121	134	83	100	128	526	162	493	162	90	75
4	276	116	127	118	100	125	525	156	456	167	89	73
5	244	112	126	146	105	125	504	151	401	147	90	71
6	206	109	127	158	105	120	483	147	342	135	88	70
7	169	106	125	160	110	115	427	147	287	129	87	71
8	143	102	124	155	110	115	415	153	244	120	100	70
9	125	98	115	140	110	115	406	151	218	110	97	69
10	113	93	100	135	110	118	402	146	199	104	95	67
11	103	92	99	130	110	131	406	139	187	108	94	66
12	96	90	92	125	110	183	407	132	175	104	93	64
13	91	89	90	120	105	336	411	129	167	99	91	63
14	89	88	90	115	105	535	412	123	160	95	89	61
15	90	87	88	110	100	692	396	119	157	91	88	62
16	90	86	88	105	100	788	373	126	156	88	86	61
17	91	84	82	105	100	870	366	142	148	117	83	63
18	148	84	79	100	100	895	360	143	141	151	80	73
19	193	87	81	100	100	882	347	142	151	160	77	72
20	210	110	83	100	100	880	328	136	169	179	86	73
21	206	143	86	100	100	862	309	146	184	214	93	74
22	201	158	91	100	100	840	287	209	201	202	93	75
23	199	156	90	100	100	808	264	292	195	176	91	76
24	188	143	88	100	100	772	246	316	177	152	90	76
25	175	129	87	105	105	737	230	312	161	130	92	79
26	162	121	88	105	110	697	219	292	151	114	89	78
27	151	135	87	110	115	632	208	279	139	104	87	83
28	152	150	81	110	120	558	197	294	145	118	85	96
29	157	157	79	110	---	496	187	291	158	115	82	98
30	153	154	80	110	---	457	168	282	149	105	80	95
31	144	---	80	110	---	473	---	274	---	98	79	---
TOTAL	5214	3462	3073	3528	2940	14733	10884	5863	6752	4060	2749	2211
MEAN	168	115	99.1	114	105	475	363	189	225	131	88.7	73.7
MAX	300	158	146	160	120	895	543	316	493	214	100	98
MIN	89	84	79	80	100	115	168	119	139	88	77	61
CFSM	1.04	.71	.61	.70	.65	2.93	2.24	1.17	1.39	.81	.55	.46
IN.	1.20	.79	.71	.81	.68	3.38	2.50	1.35	1.55	.93	.63	.51

CAL YR 1981 TOTAL 57659 MEAN 158 MAX 555 MIN 69 CFSM .98 IN 13.24
WTR YR 1982 TOTAL 65469 MEAN 179 MAX 895 MIN 61 CFSM 1.11 IN 15.03

04097500 ST. JOSEPH RIVER AT THREE RIVERS, MI

LOCATION.--Lat 41°56'25", long 85°38'00", in SW¼ SE¼ sec.18, T.6 S., R.11 W., St. Joseph County, Hydrologic Unit 04050001, on right bank in Scidmore Park at Three Rivers, 250 ft (76 m) downstream from Rocky River, and at mile 112 (180 km).

DRAINAGE AREA.--1,350 mi² (3,496 km²).

PERIOD OF RECORD.--May 1953 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 781.34 ft (238.152 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated by powerplant above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 1,142 ft³/s (32.34 m³/s), 11.49 in/yr (292 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,180 ft³/s (232 m³/s) Mar. 21, 1982, gage height, 10.69 ft (3.258 m); minimum daily, 78 ft³/s (2.21 m³/s) Sept. 12, 1964.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1918, 8,260 ft³/s (234 m³/s) Apr. 27, 1950.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 8,180 ft³/s (232 m³/s) Mar. 21, gage height, 10.69 ft (3.258 m); minimum, 294 ft³/s (8.33 m³/s) Sept. 17, gage height, 2.31 ft (0.704 m); minimum daily, 350 ft³/s (9.91 m³/s) Sept. 18.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1710	1490	1450	1010	1050	1170	4490	1820	2600	1380	895	636
2	1950	1520	1430	1010	1000	1140	4550	1760	2890	1330	975	580
3	2500	1440	1300	1060	1000	1200	4500	1670	3090	1410	964	527
4	2520	1400	1220	1220	1000	1170	4460	1620	2870	1480	938	618
5	2350	1410	1480	1310	1000	1100	4370	1740	2770	1490	809	522
6	2250	1460	1490	1510	1050	1070	4070	1800	2610	1430	958	520
7	2150	1480	1360	1540	1100	1110	3960	1610	2480	1370	847	547
8	1800	1390	1240	1490	1100	1170	3710	1590	2240	1300	539	608
9	1890	1370	1320	1400	1100	1190	3660	1650	2260	1190	832	606
10	1760	1220	1390	1300	1100	1380	3620	1700	2150	1150	996	523
11	1650	1230	1200	1200	1050	1510	3620	1630	2150	1130	917	607
12	1420	1180	1240	1150	1050	1480	3590	1480	2020	1110	795	877
13	1530	1160	1240	1150	1000	1620	3520	1460	1820	982	749	737
14	1330	1170	1180	1100	1000	2550	3430	1470	1490	959	746	585
15	1480	1170	1020	1050	1000	3730	3420	1380	1510	1130	677	527
16	1280	1090	974	1050	1050	5060	3330	1330	1610	967	632	512
17	1320	974	1030	1000	1050	6110	3190	1290	1550	1100	628	434
18	1440	1030	1120	1000	1080	6850	3130	1270	1500	1240	416	350
19	1580	1000	1180	1000	1140	7250	3070	1340	1510	1370	637	441
20	1610	1140	1110	1000	1150	7610	2980	1300	1500	1500	767	676
21	1790	1260	925	1000	1190	7810	2960	1460	1510	1450	561	631
22	1740	1270	888	1000	1260	7640	2820	1670	1460	1320	560	592
23	1630	1410	952	1000	1300	7430	2750	2020	1490	1420	578	592
24	1540	1490	1050	1000	1250	7010	2680	2250	1480	1400	814	641
25	1560	1430	938	1050	1300	6670	2510	2210	1430	1250	796	692
26	1620	1420	901	1050	1280	6260	2430	2260	1400	1070	696	706
27	1520	1460	1070	1050	1200	5910	2400	2330	1340	906	535	719
28	1550	1520	1180	1050	1180	5010	2250	2400	1290	838	503	695
29	1380	1520	1050	1050	---	4860	2130	2520	1380	1000	491	729
30	1420	1430	963	1050	---	4540	2000	2450	1400	962	515	825
31	1470	---	959	1050	---	4420	---	2370	---	920	658	---
TOTAL	52740	39534	35850	34900	31030	123030	99600	54850	56800	37554	22424	18255
MEAN	1701	1318	1156	1126	1108	3969	3320	1769	1893	1211	723	609
MAX	2520	1520	1490	1540	1300	7810	4550	2520	3090	1500	996	877
MIN	1280	974	888	1000	1000	1070	2000	1270	1290	838	416	350
CFSM	1.26	.98	.86	.83	.82	2.94	2.46	1.31	1.40	.90	.54	.45
IN.	1.45	1.09	.99	.96	.86	3.39	2.74	1.51	1.57	1.03	.62	.50

CAL YR 1981 TOTAL 587122 MEAN 1609 MAX 4000 MIN 564 CFSM 1.19 IN 16.18
WTR YR 1982 TOTAL 606567 MEAN 1662 MAX 7810 MIN 350 CFSM 1.23 IN 16.71

04097500 ST. JOSEPH RIVER AT THREE RIVERS, MI

LOCATION.--Lat 41°56'25", long 85°38'00", in SW¼ SE¼ sec.18, T.6 S., R.11 W., St. Joseph County, Hydrologic Unit 04050001, on right bank in Scidmore Park at Three Rivers, 250 ft (76 m) downstream from Rocky River, and at mile 112 (180 km).

DRAINAGE AREA.--1,350 mi² (3,496 km²).

PERIOD OF RECORD.--May 1953 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 781.34 ft (238.152 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated by powerplant above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 1,142 ft³/s (32.34 m³/s), 11.49 in/yr (292 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,180 ft³/s (232 m³/s) Mar. 21, 1982, gage height, 10.69 ft (3.258 m); minimum daily, 78 ft³/s (2.21 m³/s) Sept. 12, 1964.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1918, 8,260 ft³/s (234 m³/s) Apr. 27, 1950.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 8,180 ft³/s (232 m³/s) Mar. 21, gage height, 10.69 ft (3.258 m); minimum, 294 ft³/s (8.33 m³/s) Sept. 17, gage height, 2.31 ft (0.704 m); minimum daily, 350 ft³/s (9.91 m³/s) Sept. 18.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1710	1490	1450	1010	1050	1170	4490	1820	2600	1380	895	636
2	1950	1520	1430	1010	1000	1140	4550	1760	2890	1330	975	580
3	2500	1440	1300	1060	1000	1200	4500	1670	3090	1410	964	527
4	2520	1400	1220	1220	1000	1170	4460	1620	2870	1480	938	618
5	2350	1410	1480	1310	1000	1100	4370	1740	2770	1490	809	522
6	2250	1460	1490	1510	1050	1070	4070	1800	2610	1430	958	520
7	2150	1480	1360	1540	1100	1110	3960	1610	2480	1370	847	547
8	1800	1390	1240	1490	1100	1170	3710	1590	2240	1300	539	608
9	1890	1370	1320	1400	1100	1190	3660	1650	2260	1190	832	606
10	1760	1220	1390	1300	1100	1380	3620	1700	2150	1150	996	523
11	1650	1230	1200	1200	1050	1510	3620	1630	2150	1130	917	607
12	1420	1180	1240	1150	1050	1480	3590	1480	2020	1110	795	877
13	1530	1160	1240	1150	1000	1620	3520	1460	1820	982	749	737
14	1330	1170	1180	1100	1000	2550	3430	1470	1490	959	746	585
15	1480	1170	1020	1050	1000	3730	3420	1380	1510	1130	677	527
16	1280	1090	974	1050	1050	5060	3330	1330	1610	967	632	512
17	1320	974	1030	1000	1050	6110	3190	1290	1550	1100	628	434
18	1440	1030	1120	1000	1080	6850	3130	1270	1500	1240	416	350
19	1580	1000	1180	1000	1140	7250	3070	1340	1510	1370	637	441
20	1610	1140	1110	1000	1150	7610	2980	1300	1500	1500	767	676
21	1790	1260	925	1000	1190	7810	2960	1460	1510	1450	561	631
22	1740	1270	888	1000	1260	7640	2820	1670	1460	1320	560	592
23	1630	1410	952	1000	1300	7430	2750	2020	1490	1420	578	592
24	1540	1490	1050	1000	1250	7010	2680	2250	1480	1400	814	641
25	1560	1430	938	1050	1300	6670	2510	2210	1430	1250	796	692
26	1620	1420	901	1050	1280	6260	2430	2260	1400	1070	696	706
27	1520	1460	1070	1050	1200	5910	2400	2330	1340	906	535	719
28	1550	1520	1180	1050	1180	5010	2250	2400	1290	838	503	695
29	1380	1520	1050	1050	---	4860	2130	2520	1380	1000	491	729
30	1420	1430	963	1050	---	4540	2000	2450	1400	962	515	825
31	1470	---	959	1050	---	4420	---	2370	---	920	658	---
TOTAL	52740	39534	35850	34900	31030	123030	99600	54850	56800	37554	22424	18255
MEAN	1701	1318	1156	1126	1108	3969	3320	1769	1893	1211	723	609
MAX	2520	1520	1490	1540	1300	7810	4550	2520	3090	1500	996	877
MIN	1280	974	888	1000	1000	1070	2000	1270	1290	838	416	350
CFSM	1.26	.98	.86	.83	.82	2.94	2.46	1.31	1.40	.90	.54	.45
IN.	1.45	1.09	.99	.96	.86	3.39	2.74	1.51	1.57	1.03	.62	.50

CAL YR 1981 TOTAL 587122 MEAN 1609 MAX 4000 MIN 564 CFSM 1.19 IN 16.18
WTR YR 1982 TOTAL 606567 MEAN 1662 MAX 7810 MIN 350 CFSM 1.23 IN 16.71

04097540 PRAIRIE RIVER NEAR NOTTAWA, MI

LOCATION.--Lat 41°53'18", long 85°24'34", in NW¼ SW¼ sec.6, T.7 S., R.9 W., St. Joseph County, Hydrologic Unit 04050001, on left bank 10 ft (3 m) upstream from bridge on State Highway 66, 3.0 mi (4.8 km) upstream from unnamed tributary, and 3.0 mi (4.8 km) southeast of Nottawa.

DRAINAGE AREA.--106 mi² (275 km²).

PERIOD OF RECORD.--October 1962 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft (259 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years, 91.9 ft³/s (2.603 m³/s), 11.77 in/yr (299 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 698 ft³/s (19.8 m³/s), Mar. 20, 1982, gage height, 6.12 ft (1.865 m); minimum, 11 ft³/s (0.31 m³/s), Aug. 9, 10, Sept. 8, 9, 10, 1964; minimum gage height, 1.77 ft (0.539 m) Aug. 9, 10, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 698 ft³/s (19.8 m³/s) Mar. 20, gage height, 6.12 ft (1.865 m); minimum, 34 ft³/s (0.96 m³/s) Sept. 5, 6, 11, 12-15, 16, 17; minimum gage height, 2.31 ft (0.704 m) Sept. 5, 6.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	148	120	104	82	84	92	340	147	185	88	52	37
2	155	117	102	82	82	92	337	143	187	88	55	38
3	155	113	101	86	80	90	328	139	191	98	56	37
4	148	109	103	101	80	90	315	135	191	102	58	36
5	139	105	104	115	80	88	304	131	180	104	59	35
6	133	102	105	126	82	86	288	128	165	104	57	35
7	127	100	105	131	84	87	278	128	151	99	55	36
8	122	97	104	120	86	90	260	130	139	92	59	36
9	117	94	102	115	86	93	249	132	131	85	58	36
10	113	92	99	110	85	96	245	130	127	84	57	36
11	113	90	95	100	84	100	246	126	122	90	57	35
12	113	89	92	95	83	120	244	122	117	94	55	34
13	107	87	90	93	82	194	239	117	112	98	54	34
14	103	85	90	90	81	306	237	113	108	95	52	34
15	101	84	89	88	80	438	232	110	106	91	50	34
16	100	82	87	84	81	532	224	113	105	86	48	35
17	99	82	86	80	82	637	225	111	104	91	46	35
18	106	82	85	80	84	682	224	110	102	89	43	46
19	110	82	83	80	87	688	229	117	103	94	40	49
20	110	96	82	80	90	686	237	116	102	95	39	49
21	112	107	81	80	93	650	232	113	103	93	38	47
22	110	116	78	80	96	615	221	118	103	90	39	47
23	107	117	81	80	100	587	206	128	102	87	39	47
24	105	117	82	80	100	549	192	140	98	80	39	47
25	104	112	82	81	100	506	182	153	94	75	39	47
26	102	109	82	82	100	459	175	152	92	70	39	47
27	103	109	85	83	100	414	169	157	90	67	39	51
28	106	109	84	84	96	371	163	162	88	64	38	59
29	110	107	83	84	---	336	157	163	90	61	37	63
30	117	105	82	84	---	318	151	165	88	58	37	64
31	124	---	79	84	---	335	---	163	---	55	37	---
TOTAL	3619	3016	2807	2840	2448	10427	7129	4112	3676	2667	1471	1266
MEAN	117	101	90.5	91.6	87.4	336	238	133	123	86.0	47.5	42.2
MAX	155	120	105	131	100	688	340	165	191	104	59	64
MIN	99	82	78	80	80	86	151	110	88	55	37	34
CFSM	1.10	.95	.85	.86	.83	3.17	2.25	1.26	1.16	.81	.45	.40
IN.	1.27	1.06	.99	1.00	.86	3.66	2.50	1.44	1.29	.94	.52	.44

CAL YR 1981 TOTAL 45824 MEAN 126 MAX 468 MIN 53 CFSM 1.19 IN 16.08
WTR YR 1982 TOTAL 45478 MEAN 125 MAX 688 MIN 34 CFSM 1.18 IN 15.96

04097970 LIME LAKE OUTLET AT PANAMA, IN

LOCATION.--Lat 41°42'46", long 85°07'10", in NW¼ NW¼ sec.35, T.38 N., R.12 E., Steuben County, Hydrologic Unit 04050001, on right bank 10 ft (3 m) downstream from dam for Lime Lake, 30 ft (9 m) upstream from bridge on Orland Road, and 0.7 mile (1.1 km) northwest of Panama.

DRAINAGE AREA.--17.5 mi² (45.3 km²), of which 3.68 mi² (9.53 km²) does not contribute directly to surface runoff.

PERIOD OF RECORD.--October 1969 to current year.

GAGE.--Water-stage recorder. Datum of gage is 950.00 ft (289.560 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Occasional regulation by control structure for Lime Lake.

AVERAGE DISCHARGE.--13 years, 7.44 ft³/s (0.211 m³/s), 5.77 in/yr (146 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 46 ft³/s (1.30 m³/s) Apr. 3, 1982, gage height, 4.85 ft (1.478 m); no flow at times during 1971 and 1972.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 46 ft³/s (1.30 m³/s) Apr. 3, gage height, 4.85 ft (1.478 m); minimum daily, 0.22 ft³/s (0.006 m³/s) Oct. 9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	7.3	6.0	13	12	11	43	22	17	24	2.5	1.3
2	11	7.3	5.7	12	12	11	42	21	18	14	3.8	1.2
3	10	7.3	5.5	12	12	12	44	20	20	7.2	4.2	1.1
4	10	7.3	5.8	13	12	12	43	20	29	8.4	3.9	1.1
5	10	7.1	6.0	13	12	13	43	19	27	9.1	3.7	1.0
6	10	6.5	6.0	13	12	12	43	18	25	9.5	3.4	.99
7	10	6.2	5.8	13	12	12	42	17	24	8.8	3.2	.97
8	6.0	6.2	5.5	13	12	12	41	17	22	7.5	4.5	.99
9	.22	5.8	5.3	12	12	12	41	15	21	6.6	4.2	1.0
10	.29	5.8	5.3	12	12	12	40	14	20	6.9	3.6	1.0
11	.38	5.7	5.7	12	12	13	39	14	13	7.6	3.3	1.1
12	.49	5.5	5.7	12	12	13	39	13	6.9	6.7	3.0	1.1
13	.61	5.3	14	12	12	14	37	12	7.2	6.2	2.8	1.2
14	.80	5.3	18	12	13	15	36	12	7.6	6.9	2.8	1.1
15	1.0	5.3	16	12	13	16	35	7.4	8.6	7.1	2.7	1.1
16	1.2	5.2	15	12	12	18	35	.35	19	6.8	2.6	1.0
17	1.9	5.2	15	12	12	20	38	.50	24	10	2.4	1.1
18	2.7	5.0	14	12	12	23	37	.64	12	9.6	2.2	1.5
19	2.9	5.3	14	12	12	25	37	.75	7.7	9.1	2.1	1.4
20	3.4	5.7	13	12	12	31	36	.84	9.2	8.5	1.9	1.3
21	3.5	5.8	13	12	12	33	34	1.1	10	7.9	1.7	1.2
22	4.2	5.7	13	12	12	35	33	1.8	15	7.1	1.7	1.3
23	4.7	5.5	14	12	12	37	31	2.8	27	6.5	1.6	1.4
24	5.2	5.7	13	12	12	39	30	3.0	24	5.8	1.6	1.4
25	5.2	5.8	13	12	12	40	29	3.4	12	5.4	1.5	1.5
26	5.2	6.0	13	12	12	41	28	3.9	5.3	5.1	1.5	1.5
27	6.0	5.8	13	12	12	41	27	5.3	6.0	4.8	1.4	3.3
28	6.9	5.7	13	12	11	41	26	7.5	7.9	4.1	1.3	3.9
29	7.1	5.7	13	12	---	41	24	9.8	26	3.7	1.3	3.8
30	7.1	5.7	13	12	---	42	23	12	27	3.2	1.2	3.6
31	7.3	---	13	12	---	43	---	14	---	2.8	1.2	---
TOTAL	156.29	177.7	331.3	378	337	740	1076	389.88	498.4	236.9	78.8	45.45
MEAN	5.04	5.92	10.7	12.2	12.0	23.9	35.9	9.97	16.6	7.64	2.54	1.52
MAX	11	7.3	18	13	13	43	44	22	29	24	4.5	3.9
MIN	.22	5.0	5.3	12	11	11	23	.35	5.3	2.8	1.2	.97
CFSM	.29	.34	.61	.70	.69	1.37	2.05	.57	.95	.44	.15	.09
IN.	.33	.38	.70	.80	.72	1.57	2.29	.66	1.06	.50	.17	.10

CAL YR 1981 TOTAL 4367.39 MEAN 12.0 MAX 37 MIN .22 CFSM .69 IN 9.28
WTR YR 1982 TOTAL 4364.92 MEAN 12.0 MAX 44 MIN .22 CFSM .69 IN 9.28

STREAMS TRIBUTARY TO LAKE MICHIGAN

04099000 ST. JOSEPH RIVER AT MOTTVILLE, MI

LOCATION.--Lat 41°48'03", long 85°45'22", in SW¼ sec.6, T.8 S., R.12 W., Michigan Meridian, St. Joseph County, Hydrologic Unit 04050001, on right bank 500 ft (152 m) upstream from bridge on U.S. Highway 12 at Mottville, 0.4 mi (0.6 km) downstream from Michigan Power Co. hydroelectric plant, 4 mi (6 km) upstream from Pigeon River, and at mile 96 (154 km).

DRAINAGE AREA.--1,866 mi² (4,833 km²).

PERIOD OF RECORD.--October 1923 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1930, 1932, 1938, 1940-42, 1945. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 755.3 ft (230.22 m) Michigan Power Co. datum. Prior to Oct. 1, 1951, at site 0.4 mi (0.6 km) upstream at datum 4.2 ft (1.28 m) higher.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--59 years, 1,575 ft³/s (44.60 m³/s), 11.46 in/yr (291 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,700 ft³/s (303 m³/s) Apr. 27, 1950, gage height, 10.76 ft (3.280 m), present datum; minimum daily, 39 ft³/s (1.10 m³/s) Oct. 19, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 10,100 ft³/s (286 m³/s) Mar. 21, gage height, 9.81 ft (2.990 m); minimum, 151 ft³/s (4.28 m³/s) Aug. 23, gage height, 1.37 ft (0.418 m); minimum daily, 676 ft³/s (19.1 m³/s) Sept. 18.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2740	2100	2120	1550	1700	2300	5970	2790	3590	1890	1370	1060
2	2600	2110	2110	1680	1700	2100	5990	2680	3800	2070	1450	1000
3	2970	2090	2090	1660	1600	2100	6010	2620	4090	2090	1450	966
4	3360	2080	2030	1850	1600	2100	6000	2430	3960	2210	1450	700
5	3320	2010	2000	1950	1600	1900	5840	2530	3850	2170	1390	770
6	3110	2050	2120	2120	1700	1800	5760	2560	3590	2210	1340	877
7	3010	2090	2110	2210	1700	1800	5220	2540	3400	2120	1330	1110
8	2760	2050	1970	2150	1800	1900	5290	2420	3280	2030	1330	965
9	2530	2010	1930	1900	1800	1900	5040	2410	3140	1920	1140	1150
10	2590	1950	2010	1800	1700	2000	4880	2460	3000	1800	1150	1110
11	2430	1840	1930	1700	1700	2130	4880	2460	2980	1810	1450	809
12	2310	1800	1810	1500	1600	2290	4830	2300	2940	1840	1420	986
13	2010	1790	1840	1600	1600	2520	4800	2230	2720	1610	1290	917
14	2060	1710	1840	1700	1600	3180	4690	2110	2390	1630	1230	981
15	2010	1730	1750	1800	1600	4830	4620	2160	2180	1600	1230	979
16	2070	1780	1650	1900	1700	6090	4610	2100	2260	1820	1200	877
17	1940	1690	1600	2000	1800	7520	4590	2020	2270	1670	891	901
18	2000	1460	1610	2000	1900	8470	4350	1980	2240	1760	939	676
19	1950	1670	1670	2000	2000	8990	4210	2040	2180	2060	929	766
20	2120	1770	1710	1900	2100	9510	4200	2050	2180	2160	925	1230
21	2210	1790	1630	1900	2200	9850	4060	2030	2180	2230	752	949
22	2400	1910	1410	1800	2200	9820	4050	2310	2160	1880	896	790
23	2230	1960	1580	1800	2200	9560	3830	2860	2010	2010	929	1060
24	2090	2120	1600	1800	2300	9320	3810	2960	2190	2000	1290	1040
25	2060	2120	1600	1700	2300	8810	3640	2990	2000	1940	1330	745
26	2190	2080	1550	1700	2300	8350	3520	3010	2000	1750	1110	1020
27	2330	2150	1540	1700	2300	7840	3390	3110	1980	1550	977	1560
28	2180	2180	1690	1700	2300	7250	3310	3140	1960	1450	741	1000
29	2110	2200	1740	1700	---	6560	3180	3320	2090	1340	814	1280
30	1980	2180	1620	1700	---	6430	2850	3350	2150	1550	877	1200
31	2050	---	1440	1700	---	6070	---	3250	---	1330	869	---
TOTAL	73720	58470	55320	56170	52600	165390	137420	79220	80760	57500	35489	29474
MEAN	2378	1949	1785	1812	1879	5335	4581	2555	2692	1855	1145	982
MAX	3360	2200	2120	2210	2300	9950	6010	3350	4090	2230	1450	1560
MIN	1940	1460	1410	1500	1600	1800	2850	1980	1960	1330	741	676
CFSM	1.27	1.04	.96	.97	1.01	2.86	2.46	1.37	1.44	.99	.61	.53
IN.	1.47	1.17	1.10	1.12	1.05	3.30	2.74	1.58	1.61	1.15	.71	.59

CAL YR 1981 TOTAL 831870 MEAN 2279 MAX 4810 MIN 1020 CFSM 1.22 IN 16.58
WTR YR 1982 TOTAL 881533 MEAN 2415 MAX 9950 MIN 676 CFSM 1.29 IN 17.57

04099750 PIGEON RIVER NEAR SCOTT, IN

LOCATION.--Lat 41°44'56", long 85°34'35", in SE¼ NW¼ sec.14, T.38 N., R.8 E., Lagrange County, Hydrologic Unit 04050001, on right bank 20 ft (6 m) downstream from bridge on County Road 750 North, 1,200 ft (366 m) downstream from Page ditch, 0.7 mile (1.1 km) south of Indiana-Michigan State line, and 1.2 miles (1.9 km) northwest of Scott.

DRAINAGE AREA.--361 mi² (935 km²), of which 53.9 mi² (139.6 km²) does not contribute directly to surface runoff.

PERIOD OF RECORD.--June 1968 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 815.00 ft (248.412 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for period of no gage-height record, Jan. 6 to Mar. 17, which are poor.

AVERAGE DISCHARGE.--14 years, 358 ft³/s (10.14 m³/s), 13.47 in/yr (342 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,370 ft³/s (67.1 m³/s) Mar. 21, 1982, gage height, 7.85 ft (2.393 m); minimum daily, 42 ft³/s (1.19 m³/s) Oct. 21, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,370 ft³/s (67.1 m³/s) Mar. 21, gage height, 7.85 ft (2.393 m); minimum daily, 158 ft³/s (4.47 m³/s) Sept. 12, 16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	735	394	397	285	390	610	1650	635	675	354	224	186
2	787	394	397	293	410	600	1550	610	787	342	241	189
3	668	394	394	296	440	580	1480	589	812	437	286	175
4	606	391	397	367	460	570	1420	564	741	489	264	168
5	582	388	406	452	480	560	1360	547	712	450	249	163
6	564	388	397	560	490	540	1280	540	678	420	242	163
7	554	379	382	700	480	530	1220	537	641	400	235	171
8	520	370	376	820	470	510	1180	551	604	379	285	173
9	491	356	367	840	450	490	1140	554	560	354	295	168
10	468	348	353	820	440	480	1110	537	544	351	261	163
11	446	339	342	730	430	480	1090	510	526	459	245	160
12	427	334	331	670	420	600	1070	485	492	475	238	158
13	415	328	328	600	420	900	1060	475	463	427	230	169
14	400	323	328	560	410	1200	1060	465	436	405	223	163
15	394	317	325	520	410	1600	980	455	431	420	218	160
16	385	312	317	480	410	1900	992	445	428	420	208	158
17	376	306	309	460	410	2150	1030	440	420	407	200	160
18	385	306	304	430	410	2220	1100	430	405	448	195	194
19	403	304	290	400	420	2190	1090	425	419	422	189	193
20	394	356	280	390	440	2250	1040	415	469	403	189	176
21	373	427	300	380	460	2340	1010	410	452	365	195	170
22	362	412	312	370	490	2330	973	430	449	341	194	174
23	359	382	315	360	540	2240	925	481	421	331	196	178
24	365	373	342	360	580	2160	875	484	396	313	196	179
25	359	376	334	350	620	2100	831	440	384	295	199	191
26	353	382	304	340	640	2020	792	436	372	283	198	189
27	359	415	296	330	630	1940	747	474	362	269	198	216
28	394	427	301	330	620	1840	698	575	364	267	225	243
29	412	412	296	320	---	1760	675	606	363	253	189	229
30	403	400	290	340	---	1700	657	564	361	239	184	212
31	394	---	288	370	---	1680	---	564	---	223	180	---
TOTAL	14133	11033	10398	14523	13270	43070	32085	15673	15167	11441	6871	5391
MEAN	456	368	335	468	474	1389	1070	506	506	369	222	180
MAX	787	427	406	840	640	2340	1650	635	812	489	295	243
MIN	353	304	280	285	390	480	657	410	361	223	180	158
CFSM	1.26	1.02	.93	1.30	1.31	3.85	2.96	1.40	1.40	1.02	.62	.50
IN.	1.46	1.14	1.07	1.50	1.37	4.44	3.31	1.62	1.56	1.18	.71	.56

CAL YR 1981 TOTAL 193863 MEAN 531 MAX 1920 MIN 211 CFSM 1.47 IN 19.98
WTR YR 1982 TOTAL 193055 MEAN 529 MAX 2340 MIN 158 CFSM 1.47 IN 19.89

04100222 NORTH BRANCH ELKHART RIVER AT COSPERVILLE, IN

LOCATION.--Lat 41°28'54", long 85°28'32", in NE¼ NW¼ sec.22, T.35 N., R.9 E., Noble County, Hydrologic Unit 04050001, on right bank at downstream side of bridge on County Road 900 North, 1,300 ft (396 m) downstream from Boyd ditch, 1.7 miles (2.7 km) upstream from Hustin ditch, and 3.1 miles (5.0 km) downstream from Waldron Lake.

DRAINAGE AREA.--142 mi² (368 km²).

PERIOD OF RECORD.--October 1971 to current year. October 1950 to September 1971 at site 3.1 miles (5.0 km) upstream, published as North Branch Elkhart River near Cosperville. Records may not be equivalent.

GAGE.--Water-stage recorder. Datum of gage is 880.12 ft (268.261 m) National Geodetic Vertical Datum of 1929 (levels by State of Indiana, Department of Natural Resources).

REMARKS.--Records good except those for winter periods, which are poor. Flow regulated at times by dam at Waldron Lake.

AVERAGE DISCHARGE.--11 years, 136 ft³/s (3.852 m³/s), 13.01 in/yr (330 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 919 ft³/s (26.0 m³/s) Mar. 23, 1982, gage height, 8.12 ft (2.475 m); minimum daily, 2.4 ft³/s (0.068 m³/s) Nov. 21, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 919 ft³/s (26.0 m³/s) Mar. 23, gage height, 8.12 ft (2.475 m); minimum daily, 22 ft³/s (0.62 m³/s) Sept. 13, 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	113	118	192	105	121	190	598	267	233	115	77	29
2	114	117	181	103	127	185	564	256	269	110	58	32
3	110	124	173	111	130	181	536	240	276	146	73	33
4	105	137	167	135	135	174	520	228	275	183	79	31
5	100	145	161	147	138	170	501	216	272	196	77	28
6	104	147	157	169	140	167	479	203	261	195	76	26
7	106	149	153	171	140	164	456	201	249	190	69	27
8	105	148	147	173	138	162	436	205	235	186	74	28
9	99	145	144	162	135	160	418	201	224	177	92	27
10	95	145	139	150	131	160	408	196	212	176	85	25
11	87	150	133	142	127	175	395	188	187	200	77	24
12	83	153	128	136	125	240	389	178	189	216	69	23
13	81	151	125	130	124	428	391	170	176	218	66	22
14	78	148	122	123	130	589	391	162	166	213	61	22
15	78	142	118	119	140	683	383	153	159	204	63	24
16	76	136	116	116	156	752	375	150	153	193	56	23
17	77	128	113	114	169	854	401	150	147	181	51	23
18	87	124	110	114	174	854	420	147	140	171	49	32
19	96	131	106	116	175	814	420	142	137	170	47	34
20	99	159	103	118	191	860	418	138	136	175	51	32
21	99	184	101	119	193	896	410	135	140	170	49	29
22	100	194	103	120	201	916	399	137	140	164	39	27
23	104	198	108	121	207	913	383	147	136	156	43	26
24	106	198	110	120	214	896	367	150	128	146	54	29
25	106	194	107	118	214	870	355	148	120	135	45	49
26	103	194	107	116	214	833	340	144	111	124	40	50
27	109	203	109	112	201	788	328	154	104	116	35	57
28	119	206	109	109	199	738	313	181	99	108	31	67
29	122	204	107	108	---	692	299	188	106	100	28	64
30	122	199	102	111	---	656	282	188	117	93	27	58
31	120	---	103	113	---	632	---	188	---	86	27	---
TOTAL	3103	4771	3954	4921	4479	15792	12375	5551	5297	5013	1768	1000
MEAN	100	159	128	126	160	542	413	179	177	162	57.0	33.3
MAX	122	206	192	173	214	916	598	267	276	218	92	67
MIN	76	117	101	103	121	160	282	135	99	86	27	22
CFSM	.70	1.12	.90	.89	1.13	3.82	2.91	1.26	1.25	1.14	.40	.24
IN.	.81	1.25	1.04	1.03	1.17	4.48	3.24	1.45	1.39	1.31	.46	.26

CAL YR 1981 TOTAL 68093 MEAN 187 MAX 566 MIN 35 CFSM 1.32 IN 17.84
WTR YR 1982 TOTAL 68024 MEAN 186 MAX 916 MIN 22 CFSM 1.31 IN 17.82

04100500 ELKHART RIVER AT GOSHEN, IN

LOCATION.--Lat 41°35'36", long 85°50'55", in NE¼ NE¼ sec.8, T.36 N., R.6 E., Elkhart County, Hydrologic Unit 04050001, on right bank 20 ft (6 m) downstream from River Avenue bridge at Goshen, 0.4 mile (0.6 km) upstream from Rock Run, and at mile 16.1 (25.9 km).

DRAINAGE AREA.--594 mi² (1,538 km²).

PERIOD OF RECORD.--April 1931 to current year.

REVISED RECORDS.--WSP 1337: 1939(M). WSP 1557: 1954. WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 769.43 ft (234.522 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 20, 1931, nonrecording gage at same site and datum.

REMARKS.--Records good except those for winter periods, which are poor.

AVERAGE DISCHARGE.--51 years, 511 ft³/s (14.47 m³/s), 11.68 in/yr (297 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,180 ft³/s (175 m³/s) Mar. 14, 1982, gage height, 11.94 ft (3.639 m); minimum daily, 7.0 ft³/s (0.20 m³/s) Aug. 11, 1964, result of extreme regulation.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,800 ft³/s (51.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 14	1400	*6,180	175	*11.94	3.639	Mar. 31	2100	2,160	61.2	6.03	1.838
Mar. 17	1100	5,070	144	10.46	3.188	Apr. 18	0700	1,810	51.3	5.45	1.661

Minimum daily discharge, 157 ft³/s (4.45 m³/s) Sept. 13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	630	472	683	430	517	895	2060	841	796	524	320	199
2	515	492	673	405	552	895	1870	793	1050	473	349	204
3	460	498	648	450	596	870	1770	739	944	743	343	196
4	437	487	637	717	650	824	1700	697	882	1240	328	202
5	421	480	641	1110	675	865	1600	675	866	1120	325	202
6	455	491	615	1130	685	844	1520	643	856	914	315	182
7	521	497	597	899	680	803	1430	645	844	847	333	184
8	483	498	584	702	660	763	1370	657	826	812	424	193
9	459	491	569	590	645	743	1350	633	797	786	394	186
10	456	481	545	450	630	729	1340	617	773	765	359	181
11	467	473	524	381	615	829	1330	605	733	780	340	191
12	468	474	500	433	600	1550	1380	592	695	770	325	166
13	463	469	500	487	585	3560	1580	581	659	737	309	157
14	448	464	491	470	579	5050	1550	565	621	719	296	162
15	439	459	480	450	588	5020	1350	545	596	743	285	168
16	428	451	464	435	606	4260	1280	536	575	715	285	171
17	422	443	453	425	638	4960	1490	543	553	653	268	172
18	434	434	448	415	695	4450	1760	521	529	611	250	213
19	452	433	425	410	743	3940	1540	511	559	597	242	209
20	451	527	367	420	778	4090	1440	485	546	590	263	198
21	437	641	362	445	865	3950	1380	475	546	571	255	191
22	420	655	421	468	970	3570	1340	519	548	558	245	187
23	426	615	412	478	1020	3270	1280	563	506	553	252	185
24	414	609	403	486	1050	3040	1230	542	484	506	240	181
25	409	608	393	495	1050	2860	1170	520	467	477	252	184
26	409	620	425	484	995	2700	1120	517	449	453	243	212
27	429	741	422	462	960	2510	1060	582	435	431	232	241
28	476	822	420	436	920	2330	1010	849	451	427	209	258
29	502	735	414	425	---	2170	956	856	692	405	193	286
30	492	695	356	460	---	2070	893	736	663	371	194	291
31	481	---	391	490	---	2110	---	708	---	337	196	---
TOTAL	14204	16255	15263	16338	20547	77420	42149	19291	19941	20228	8864	5952
MEAN	458	542	492	527	734	2497	1405	622	665	653	286	198
MAX	630	822	683	1130	1050	5950	2060	856	1050	1240	424	291
MIN	409	433	356	381	517	729	893	475	435	337	193	157
CFSM	.77	.91	.83	.89	1.24	4.20	2.37	1.05	1.12	1.10	.48	.33
IN.	.89	1.02	.96	1.02	1.29	4.85	2.64	1.21	1.25	1.27	.56	.37

CAL YR 1981 TOTAL 274029 MEAN 751 MAX 3120 MIN 254 CFSM 1.26 IN 17.16
WTR YR 1982 TOTAL 276452 MEAN 757 MAX 5950 MIN 157 CFSM 1.27 IN 17.31

04101000 ST. JOSEPH RIVER AT ELKHART, IN

LOCATION.--Lat 41°41'30", long 85°58'30", in SW¼ NE¼ sec.5, T.37 N., R.5 E., Elkhart County, Hydrologic Unit 04050001, on left bank 200 ft (61 m) downstream from mouth of Elkhart River, 200 ft (61 m) upstream from Main Street bridge in Elkhart, 2,000 ft (610 m) downstream from Christiana Creek, 0.5 mile (0.8 km) downstream from Elkhart Hydroelectric Plant, and at mile 76.5 (123.1 km).

DRAINAGE AREA.--3,370 mi² (8.728 km²).

PERIOD OF RECORD.--August 1947 to current year. Gage heights at site 0.8 mile (1.3 km) downstream at different datum from September 1924 to March 1926 are available from the district office.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 700.00 ft (213.360 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for winter period, which are poor. The flow is regulated by Elkhart Hydroelectric Plant.

AVERAGE DISCHARGE.--35 years, 3,160 ft³/s (89.49 m³/s), 12.73 in/yr (323 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 18,600 ft³/s (527 m³/s) Mar. 21, 1982, gage height, 27.91 ft (8.507 m); minimum daily, 336 ft³/s (9.52 m³/s) Aug. 5, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 18,600 ft³/s (527 m³/s) Mar. 21, gage height, 27.91 ft (8.507 m); minimum daily, 1,320 ft³/s (37.4 m³/s) Aug. 31.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4820	3550	3970	2820	3400	3960	11300	5280	6280	3650	2390	1770
2	4530	3170	3940	3080	3200	3990	10800	5090	6510	3670	2870	1720
3	4710	3510	3910	3140	3300	3920	10800	4970	6650	4270	2530	1660
4	5220	3620	3860	4020	3200	3920	10700	4740	6660	4820	2440	1380
5	5110	3380	3780	4540	3100	3740	10300	4550	6380	4770	2500	1430
6	4870	3410	3880	4770	3200	3800	9930	4690	6110	4470	2370	1530
7	4770	3320	3990	4600	3400	3800	9440	4690	5790	4250	2410	1820
8	4510	3580	3960	3970	3500	3730	9060	4520	5600	4010	2790	1720
9	4170	3610	3780	3600	3100	3750	8890	4440	5380	3880	2570	1740
10	4160	3150	3480	3300	3200	3750	8680	4470	5210	3590	2170	1880
11	4100	3260	3620	3100	3500	4240	8520	4420	4940	3770	2550	1500
12	3830	2640	3340	3000	3100	5490	8550	4260	5030	3740	2500	1440
13	4040	3140	3240	3000	3100	7720	8830	3980	4710	3630	2330	1700
14	3590	3060	2630	3200	3100	12700	8710	4010	4340	3530	2190	1590
15	2840	3050	3130	3400	3200	14600	8190	3830	4030	3550	2170	1620
16	3570	3120	3440	3600	3300	14500	8100	3810	4020	3630	2200	1550
17	3360	3040	2960	3600	3500	17100	8480	3770	4030	3600	1820	1590
18	3530	2900	3020	3700	3400	17800	8540	3630	3980	3510	1950	1580
19	4120	2820	3000	3700	3700	17400	7870	3690	3880	3880	1900	1550
20	3130	3450	2900	3600	3910	19100	7780	3770	3880	4050	1520	2040
21	3760	3620	2620	3500	4120	18500	7650	3650	3950	3980	1540	1880
22	3800	3750	3160	3500	4270	18100	7420	4060	3780	3710	1840	1510
23	3340	3760	2910	3400	4390	17400	7170	4760	3580	3630	2040	1610
24	3900	3800	2750	3300	4540	16600	6900	4950	3560	3550	1830	1800
25	3650	3830	2970	3200	4390	15900	6750	4920	3580	3450	2290	1500
26	3470	3800	3340	3200	4290	15100	6430	4870	3400	3620	2070	1720
27	3760	4180	3210	3200	4170	14300	6250	4990	3380	2640	1530	2290
28	3590	4240	3050	3200	4060	13500	5990	5740	3380	2600	1500	2480
29	3640	4200	3110	3200	---	12500	5800	5670	4010	2550	1590	1610
30	3490	4070	2820	3200	---	11800	5450	5640	4110	2680	1930	2180
31	3460	---	2930	3200	---	11700	---	5590	---	2410	1320	---
TOTAL	122840	104030	102700	107840	100840	333450	249280	141450	140140	113090	65650	51390
MEAN	3963	3468	3313	3479	3601	10760	8309	4563	4671	3648	2118	1713
MAX	5220	4240	3990	4770	4540	18500	11300	5740	6660	4820	2870	2480
MIN	2840	2640	2620	2820	3100	3730	5450	3630	3380	2410	1320	1380
CFSM	1.18	1.03	.98	1.03	1.07	3.19	2.47	1.35	1.39	1.08	.63	.51
IN.	1.36	1.15	1.13	1.19	1.11	3.68	2.75	1.56	1.55	1.25	.72	.57

CAL YR 1981 TOTAL 1582770 MEAN 4336 MAX 10600 MIN 1960 CFSM 1.29 IN 17.47
WTR YR 1982 TOTAL 1632700 MEAN 4473 MAX 18500 MIN 1320 CFSM 1.33 IN 18.02

04101500 ST. JOSEPH RIVER AT NILES, MI
(National stream-quality accounting network station)

LOCATION.--Lat 41°49'45", long 86°15'35", in SW¼ sec.26, T.7 S., R.17 W., Berrien County, Hydrologic Unit 04050001, on right bank 100 ft (30 m) upstream from Main Street Bridge at Niles, 0.6 mi (1.0 km) downstream from dam at French Paper Co., 1 mi (2 km) upstream from Dowagiac River, and at mile 44 (71 km).

DRAINAGE AREA.--3,666 mi² (9,495 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1931, 1933-36, 1940-43, 1945-46(M). WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 633.02 ft (192.944 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1968, at datum 2.00 ft (0.610 m) higher. Oct. 1, 1930 to Feb. 11, 1931, nonrecording gage on Main Street Bridge, and Feb. 12 to June 30, 1931, nonrecording gage 50 ft (15 m) upstream from present site (gage heights referred to NGVD). Since Apr. 13, 1970, auxiliary water-stage recorder at sewage-treatment plant, 1.1 mi (1.8 km) downstream from base gage at same datum. Oct. 1, 1943 to Apr. 12, 1970, auxiliary gage was headwater gage at hydroelectric plant at Buchanan Dam, 8 mi (13 km) downstream from base gage at different datum.

REMARKS.--Water-discharge records good except those for January, which are fair. Flow regulated by powerplants above station.

AVERAGE DISCHARGE.--52 years, 3,241 ft³/s (91.79 m³/s), 12.01 in/yr (305 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 20,200 ft³/s (572 m³/s) Apr. 5, 1950, gage height, 15.10 ft (4.602 m), present datum; minimum daily, 420 ft³/s (11.9 m³/s) Aug. 30, 1931.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 19,900 ft³/s (564 m³/s) Mar. 21, gage height, 14.97 ft (4.563 m); minimum daily, 1,040 ft³/s (29.5 m³/s) Dec. 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5500	4000	4230	3160	3620	4090	12000	5540	7490	4260	2740	1800
2	5200	4100	4180	3290	3480	4180	11600	5390	7830	3720	3200	2390
3	5410	4090	4150	3470	3530	4170	11300	5170	7220	5130	3950	2110
4	6160	4000	4150	4240	3500	4130	11200	5170	7150	5540	2200	1880
5	6320	3850	4020	5710	3330	4010	11100	4800	6950	5420	2840	1390
6	6110	3160	3960	5540	3560	3970	10800	5030	6670	4860	2960	1980
7	5870	3790	4250	5110	3670	4020	10300	5070	6210	4630	2650	2070
8	5400	3680	4120	4060	3780	3810	9750	4880	6100	4370	3570	1950
9	5120	3750	4300	3650	3390	3890	9590	4720	5720	4280	3140	2120
10	4890	3750	4360	3390	3460	3850	9520	4560	5590	4140	2820	2460
11	4700	3360	4040	3400	3730	4460	9320	4860	5390	4250	2700	1950
12	4500	3390	4090	3300	3290	5870	9120	4680	5250	4100	2850	1930
13	4200	3210	4050	3200	3360	9530	9200	4090	5120	3990	2780	1910
14	4400	3320	3890	3500	3380	15700	9590	4440	4720	4440	2850	1980
15	4320	3200	1040	3700	3430	17200	9030	4030	4450	5430	2440	2060
16	2790	3290	3590	3900	3620	16300	8500	4220	4340	4620	2470	1790
17	3700	3370	3300	4000	3750	19100	9030	4120	4210	4670	2380	1990
18	4000	3240	3220	4000	3890	19400	9430	3980	4230	4020	2090	2240
19	4460	2920	3270	4000	4110	18600	8900	4290	4320	4250	2760	1980
20	4000	3830	3100	3900	4200	19200	8090	4040	4100	4550	2120	1990
21	4310	4040	2940	3800	4390	19800	8200	4010	4610	4340	1930	2610
22	4770	4010	3260	3800	4560	19100	8030	4520	4830	4570	2010	2400
23	4400	4140	3260	3700	4690	18200	7800	5260	4130	3810	2440	1610
24	4200	3930	3040	3600	4920	17300	7320	5470	3880	3970	2080	1830
25	4000	4070	3040	3500	4740	16300	7140	5370	3990	3830	2690	2300
26	4200	4090	3350	3500	4520	15800	7090	5180	3940	3770	2520	1950
27	4360	4310	3220	3400	4440	15000	6830	5540	3800	4720	2230	2090
28	4200	4740	3200	3400	4350	14200	6370	6260	3960	1960	1820	2800
29	4100	4540	3350	3400	---	13000	6270	6170	3380	3050	1870	2720
30	3900	4270	3030	3460	---	12600	6050	6100	4320	2860	2370	2200
31	3900	---	3260	3400	---	12600	---	5830	---	3030	1820	---
TOTAL	143330	113440	110260	117480	108690	358380	268470	152790	153900	130580	79290	62480
MEAN	4624	3781	3557	3790	3882	11560	8949	4929	5130	4212	2558	2083
MAX	6320	4740	4360	5710	4920	19800	12000	6260	7830	5540	3950	2800
MIN	2790	2920	1040	3160	3290	3810	6050	3980	3380	1960	1820	1390
CFSM	1.26	1.03	.97	1.03	1.06	3.15	2.44	1.35	1.40	1.15	.70	.57
IN.	1.45	1.15	1.12	1.19	1.10	3.64	2.72	1.55	1.56	1.33	.80	.63

CAL YR 1981 TOTAL 1713030 MEAN 4693 MAX 12700 MIN 1040 CFSM 1.28 IN 17.38
WTR YR 1982 TOTAL 1799090 MEAN 4929 MAX 19800 MIN 1040 CFSM 1.35 IN 18.26

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1979 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1979 to current year.
WATER TEMPERATURE: February 1979 to current year.

INSTRUMENTATION.--Water-quality monitor since Oct. 9, 1980.

REMARKS.--Bimonthly samples collected from Grant Street bridge 0.2 mi (0.3 km) upstream from gage. Interruptions in the daily record were due to malfunctions of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum (water years 1979, 1982), 678 micromhos Feb. 16, 1982; minimum (water years 1979, 1982), 278 micromhos Mar. 19, 1982.
WATER TEMPERATURES: Maximum daily recorded (water years 1980, 1982), 29.0°C July 20, 21, 1980; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 678 micromhos Feb. 16; minimum, 278 micromhos Mar. 19.
WATER TEMPERATURES: Maximum, 27.0°C July 28; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV												
04...	1215	4950	530	8.2	12.0	11.2	105	--	210	250	21	71
DEC												
15...	1345	818	562	7.9	2.0	13.1	96	1500	--	260	40	71
MAR												
10...	0930	3850	629	7.7	1.0	--	--	1200	340	280	61	78
19...	1100	18400	--	--	--	--	--	--	--	160	40	46
MAY												
26...	1030	4970	507	7.5	16.0	9.6	99	3600	1100	240	37	65
JUL												
08...	0900	4640	525	7.8	25.0	8.4	104	2200	280	240	47	66
SEP												
29...	1100	2640	544	--	17.0	9.4	99	700	K110	260	54	68

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
NOV												
04...	18	8.8	7	1.7	230	--	21	.2	6.4	337	--	.46
DEC												
15...	20	17	12	1.9	220	35	38	.2	7.2	365	315	.50
MAR												
10...	21	15	10	2.2	220	38	30	.2	7.5	378	324	.51
19...	11	5.6	7	2.7	120	33	13	.1	5.3	215	189	.29
MAY												
26...	19	9.4	8	1.7	204	40	17	.2	6.3	356	281	.48
JUL												
08...	19	10	8	1.5	196	36	16	.2	6.5	232	273	.32
SEP												
29...	22	13	10	1.4	207	40	22	.2	5.0	306	296	.42

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV												
04...	4500	1.2	.140	.18	1.00	.060	.18	.050	.020	23	307	100
DEC												
15...	806	1.7	.340	.44	.93	.060	.18	.010	<.010	11	24	100
MAR												
10...	3930	1.8	.370	.48	.80	.050	.15	.020	.010	8	83	100
19...	10700	1.8	.240	.31	.89	.150	.46	.060	.040	124	6160	--
MAY												
26...	4700	1.3	.240	.31	.80	.100	.31	.020	.010	26	349	100
JUL												
08...	2910	1.8	.050	.06	1.30	.080	.25	<.010	<.010	22	276	100
SEP												
29...	2180	1.1	.260	.33	.90	.090	.28	.030	.010	26	185	100

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
DEC										
15...	1345	1	1	100	54	<1	<1	10	<10	<1
MAR										
10...	0930	3	<1	100	57	<1	<1	60	10	2
19...	1100	2	1	100	39	1	<1	10	10	2
JUL										
08...	0900	2	1	<100	59	1	<1	90	<10	3
SEP										
29...	1100	2	1	100	67	1	<1	10	<10	<1

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
DEC										
15...	<1	8	<1	410	27	<1	<1	40	32	.1
MAR										
10...	1	5	<1	800	3	2	<1	50	44	.2
19...	<1	87	7	1500	61	30	<1	120	19	.2
JUL										
08...	1	8	4	1400	22	5	3	80	1	1.8
SEP										
29...	<1	8	4	480	32	5	<1	80	4	7.0

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
DEC									
15...	<.1	5	1	<1	<1	<1	<1	50	9
MAR									
10...	.1	55	3	<1	<1	<1	<1	20	7
19...	.1	6	1	<1	<1	<1	<1	30	6
JUL									
08...	1.6	68	3	<1	<1	<1	<1	20	5
SEP									
29...	1.2	6	5	<1	<1	<1	<1	10	<4

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	486	459	472	536	530	534	595	592	594	602	594	598
2	487	477	483	536	531	534	602	593	597	603	588	599
3	487	471	479	535	529	532	602	597	599	618	602	611
4	476	472	474	539	529	534	606	600	603	612	581	597
5	481	476	478	542	532	537	609	606	608	582	544	570
6	497	483	487	547	535	540	613	610	611	543	525	533
7	494	489	491	548	537	542	615	610	613	546	537	540
8	501	493	496	547	539	544	619	612	616	562	548	556
9	507	500	503	551	541	545	643	618	626	575	563	569
10	513	502	506	549	542	546	643	635	639	590	567	577
11	512	504	508	555	545	551	640	635	638	599	581	592
12	517	507	510	558	551	555	639	630	635	599	586	594
13	519	513	516	564	558	561	638	635	636	604	593	601
14	522	514	517	561	555	559	648	640	645	605	593	602
15	525	516	521	565	560	562	657	650	654	603	596	600
16	559	525	538	568	562	566	612	567	589	603	601	602
17	532	523	527	571	568	570	597	586	589	608	604	606
18	529	501	522	573	568	571	594	588	590	608	605	607
19	524	515	518	581	552	576	590	586	588	618	605	611
20	522	517	519	572	544	558	590	586	588	618	606	615
21	529	513	520	572	561	567	594	585	588	616	604	612
22	528	515	520	572	564	569	599	595	597	617	597	615
23	528	511	518	570	566	568	615	596	604	621	613	617
24	528	516	522	587	569	577	612	604	607	626	615	621
25	529	520	525	591	574	581	607	585	597	620	616	618
26	528	523	525	585	564	577	596	592	593	621	616	618
27	533	522	525	583	575	578	596	586	594	625	617	621
28	530	523	526	586	578	583	603	597	599	631	617	621
29	536	527	531	588	583	585	600	593	595	633	623	626
30	535	528	531	591	586	588	597	587	595	653	624	639
31	534	530	532	---	---	---	596	587	592	651	622	636
MONTH	559	459	511	591	529	560	657	567	607	653	525	601

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	626	614	620	600	589	594	452	447	449	517	505	511
2	615	599	607	611	601	605	461	446	452	517	513	515
3	606	599	603	615	607	611	450	439	444	519	513	517
4	601	598	600	613	603	607	---	---	---	523	511	518
5	602	599	601	633	606	615	---	---	---	526	520	524
6	602	597	600	623	614	619	---	---	---	530	521	526
7	608	594	603	624	609	615	---	---	---	531	524	527
8	609	596	601	613	604	609	---	---	---	528	522	524
9	604	599	602	625	606	612	---	---	---	529	523	526
10	613	579	605	642	616	627	---	---	---	531	524	527
11	611	586	601	648	611	632	---	---	---	535	524	529
12	610	602	607	611	574	600	---	---	---	532	526	530
13	609	605	608	558	411	504	---	---	---	---	---	---
14	617	604	609	397	311	338	---	---	---	---	---	---
15	657	611	625	320	302	307	---	---	---	---	---	---
16	678	638	653	342	322	335	---	---	---	---	---	---
17	650	634	640	328	281	299	---	---	---	---	---	---
18	652	612	630	282	279	280	---	---	---	---	---	---
19	632	614	622	336	278	312	---	---	---	---	---	---
20	628	611	620	335	330	332	477	471	474	---	---	---
21	620	596	606	331	322	325	480	476	477	---	---	---
22	604	587	597	329	326	328	483	477	480	---	---	---
23	592	576	583	332	327	329	487	479	483	---	---	---
24	589	579	583	427	330	388	489	466	485	---	---	---
25	592	582	586	438	370	408	493	488	490	---	---	---
26	602	582	591	435	380	413	497	491	494	---	---	---
27	589	582	585	435	408	417	503	496	499	---	---	---
28	591	584	588	436	421	428	506	466	502	---	---	---
29	---	---	---	446	431	436	508	501	506	---	---	---
30	---	---	---	445	434	441	509	496	505	---	---	---
31	---	---	---	448	436	443	---	---	---	---	---	---
MONTH	678	576	606	648	278	445						

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	511	488	500	511	508	509	545	535	539
2	---	---	---	516	465	492	512	478	501	543	526	536
3	471	455	464	531	430	481	502	490	499	542	526	536
4	459	455	457	532	461	489	527	493	506	544	537	539
5	465	445	457	508	439	476	528	504	510	545	527	537
6	476	445	454	500	460	477	514	508	511	546	529	540
7	468	455	459	501	471	487	516	500	512	539	519	529
8	478	455	464	523	485	507	508	471	493	537	521	531
9	488	465	476	539	476	517	504	493	497	542	531	536
10	485	450	473	528	498	517	507	486	498	542	523	535
11	486	465	475	519	489	505	499	488	492	539	523	533
12	481	475	477	508	501	505	520	500	507	540	533	536
13	492	475	481	510	493	503	512	501	505	541	534	538
14	492	475	482	502	446	479	508	491	501	542	535	540
15	516	486	499	468	438	455	509	496	506	542	535	539
16	512	495	501	462	430	441	510	503	507	553	537	545
17	512	496	505	478	452	466	518	504	512	548	527	543
18	517	495	508	494	484	488	521	505	515	545	518	531
19	511	495	505	494	468	482	520	505	512	535	518	527
20	511	495	504	491	479	484	508	466	499	549	529	543
21	518	505	510	493	481	489	511	497	506	547	530	540
22	515	505	509	493	483	487	513	497	507	538	531	535
23	520	505	513	496	486	489	522	498	510	547	531	540
24	522	496	514	499	488	491	522	500	514	549	542	547
25	528	505	519	500	490	495	523	510	516	547	533	540
26	532	501	517	497	482	493	520	501	513	544	533	539
27	522	505	514	496	484	490	525	511	520	544	534	537
28	517	462	509	---	---	---	528	513	523	---	---	---
29	530	459	498	521	499	507	530	525	528	472	468	470
30	516	492	502	508	504	506	527	514	524	483	476	480
31	---	---	---	509	494	505	537	515	528	---	---	---
MONTH							537	466	509			

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	16.0	15.0	15.5	11.5	10.5	11.0	4.0	4.0	4.0	1.0	.5	.5
2	14.5	13.5	14.0	11.5	11.5	11.5	4.0	3.5	4.0	.5	.0	.0
3	13.5	12.5	13.0	12.0	11.5	12.0	4.0	3.5	3.5	1.0	.5	1.0
4	13.0	12.5	13.0	13.0	12.0	12.5	4.0	4.0	4.0	1.0	.5	1.0
5	13.0	12.5	13.0	13.0	12.5	12.5	4.0	3.5	4.0	1.0	.0	.5
6	13.5	13.0	13.0	12.5	10.5	11.5	4.0	3.5	3.5	1.0	.5	.5
7	13.0	12.5	13.0	11.0	10.5	10.5	4.0	3.5	3.5	.5	.5	.5
8	13.0	12.0	12.5	10.5	10.0	10.0	4.0	3.0	3.5	.0	.0	.0
9	13.0	12.0	12.5	10.0	9.0	9.0	3.0	3.0	3.0	.0	.0	.0
10	13.0	12.0	12.5	8.5	8.0	8.0	3.0	2.5	3.0	.0	.0	.0
11	12.5	11.5	12.5	8.0	7.5	8.0	2.5	2.0	2.5	.0	.0	.0
12	13.0	12.0	12.5	7.5	7.0	7.0	2.5	2.0	2.5	.0	.0	.0
13	13.0	12.0	12.5	7.0	6.5	7.0	2.5	2.0	2.0	.0	.0	.0
14	13.0	12.5	12.5	7.0	6.5	7.0	2.5	2.0	2.5	.0	.0	.0
15	13.0	12.5	12.5	7.0	6.5	6.5	---	---	---	.0	.0	.0
16	13.0	12.0	12.5	7.5	6.5	7.0	3.0	2.0	2.5	.0	.0	.0
17	12.5	12.0	12.0	7.5	7.0	7.5	2.0	1.5	2.0	.0	.0	.0
18	12.5	11.0	12.0	7.5	7.0	7.5	1.5	1.0	1.5	.0	.0	.0
19	11.0	10.5	11.0	7.5	7.5	7.5	1.0	1.0	1.0	.0	.0	.0
20	11.0	10.0	10.5	7.5	6.5	7.0	1.0	.0	.5	.0	.0	.0
21	11.0	10.0	10.5	6.5	6.0	6.5	.5	.0	.0	.0	.0	.0
22	10.0	9.5	10.0	6.0	5.0	5.5	1.0	.5	.5	.0	.0	.0
23	10.0	8.5	9.0	4.5	4.0	4.0	.5	.5	.5	.0	.0	.0
24	8.5	8.0	8.5	4.0	3.5	4.0	.5	.0	.0	.0	.0	.0
25	8.0	7.5	8.0	3.5	3.0	3.5	.5	.0	.0	.0	.0	.0
26	8.0	7.5	8.0	4.5	3.5	4.0	1.0	.5	.5	.0	.0	.0
27	9.0	8.0	8.5	5.0	4.0	4.5	1.0	1.0	1.0	.0	.0	.0
28	9.0	8.0	8.5	4.5	4.0	4.5	1.0	.5	.5	.0	.0	.0
29	9.5	8.5	9.0	4.5	4.0	4.5	.5	.0	.5	.0	.0	.0
30	10.0	9.0	9.5	4.0	3.5	4.0	.5	.0	.0	.5	.0	.5
31	10.5	10.0	10.0	---	---	---	1.0	.5	.5	.5	.0	.0
MONTH	16.0	7.5	11.5	13.0	3.0	7.5				1.0	.0	.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	FEBRUARY MAX	FEBRUARY MIN	FEBRUARY MEAN	MARCH MAX	MARCH MIN	MARCH MEAN	APRIL MAX	APRIL MIN	APRIL MEAN	MAY MAX	MAY MIN	MAY MEAN
1	.0	.0	.0	2.0	1.0	1.5	8.5	7.5	8.0	14.5	13.0	14.0
2	.5	.0	.0	2.5	1.5	1.5	8.5	8.0	8.5	15.5	13.0	14.0
3	.5	.0	.0	2.0	1.0	1.5	8.5	7.0	8.0	16.5	14.0	15.0
4	.5	.0	.0	2.0	.5	1.0	---	---	---	17.5	15.0	16.5
5	.5	.0	.0	1.5	.5	1.0	---	---	---	18.0	16.5	17.0
6	.0	.0	.0	1.5	.5	1.0	---	---	---	18.0	17.0	17.5
7	.0	.0	.0	1.5	1.0	1.0	---	---	---	18.0	17.0	17.5
8	.0	.0	.0	1.5	.5	1.0	---	---	---	18.5	17.0	18.0
9	.0	.0	.0	1.5	.5	1.0	---	---	---	18.5	17.0	18.0
10	.0	.0	.0	1.5	1.0	1.5	---	---	---	19.0	17.0	18.0
11	.0	.0	.0	3.0	2.0	2.5	---	---	---	20.0	17.5	19.0
12	.0	.0	.0	3.5	2.0	2.5	---	---	---	20.0	18.5	19.0
13	.0	.0	.0	3.5	2.5	3.0	---	---	---	---	---	---
14	.5	.0	.0	2.5	1.5	2.0	---	---	---	---	---	---
15	1.5	.5	1.0	1.5	1.5	1.5	---	---	---	---	---	---
16	1.5	1.0	1.0	2.5	1.5	2.0	---	---	---	---	---	---
17	1.5	.5	1.0	3.0	2.5	2.5	---	---	---	---	---	---
18	1.0	.5	1.0	3.0	3.0	3.0	---	---	---	---	---	---
19	1.0	.5	.5	3.0	2.5	2.5	---	---	---	---	---	---
20	1.0	.5	1.0	2.5	2.5	2.5	---	---	---	---	---	---
21	1.0	.5	1.0	2.5	2.5	2.5	13.0	12.5	12.5	---	---	---
22	1.5	1.0	1.0	3.5	2.5	3.0	13.0	12.0	12.5	---	---	---
23	1.5	1.0	1.0	4.5	3.0	4.0	13.0	11.5	12.0	---	---	---
24	1.5	.5	1.0	5.5	4.5	5.0	13.0	11.5	12.5	---	---	---
25	1.5	.5	1.0	5.5	5.0	5.0	14.0	12.0	13.0	---	---	---
26	1.5	.0	1.0	5.0	4.0	4.5	14.0	12.5	13.5	---	---	---
27	1.5	.5	1.0	4.0	3.0	3.5	14.0	13.5	14.0	---	---	---
28	2.0	.5	1.0	3.5	2.5	3.0	14.5	13.0	14.0	---	---	---
29	---	---	---	4.5	3.0	4.0	14.5	13.0	13.5	---	---	---
30	---	---	---	6.5	4.5	5.5	14.0	13.0	13.5	---	---	---
31	---	---	---	8.0	6.0	7.0	13.5	13.0	13.5	---	---	---
MONTH	2.0	.0	.5	8.0	.5	2.5	---	---	---	---	---	---

DAY	JUNE MAX	JUNE MIN	JUNE MEAN	JULY MAX	JULY MIN	JULY MEAN	AUGUST MAX	AUGUST MIN	AUGUST MEAN	SEPTEMBER MAX	SEPTEMBER MIN	SEPTEMBER MEAN
1	---	---	---	23.0	21.0	22.0	25.5	24.0	24.5	21.5	20.5	21.0
2	---	---	---	22.5	21.5	22.0	25.0	24.0	24.5	21.5	20.5	21.0
3	20.5	19.0	19.5	22.5	21.5	22.0	25.5	24.0	25.0	21.0	20.0	20.5
4	19.0	18.0	18.5	23.0	21.0	22.0	25.5	24.0	25.0	21.5	20.0	20.5
5	19.0	17.5	18.0	24.0	21.5	22.5	25.0	24.0	24.5	21.5	20.0	21.0
6	19.0	17.0	18.0	25.0	22.5	23.5	25.5	24.0	25.0	21.5	20.0	20.5
7	20.0	18.0	19.0	26.5	23.5	24.5	25.5	24.5	25.0	20.5	19.5	20.0
8	21.0	19.0	20.0	26.0	24.0	25.0	25.5	24.0	24.5	20.5	19.0	20.0
9	21.0	20.0	20.5	26.0	24.0	25.0	25.5	24.0	24.5	21.0	19.5	20.0
10	21.5	20.0	20.5	26.0	24.5	25.0	24.5	23.0	23.5	21.0	20.0	20.5
11	22.0	19.5	21.0	25.0	24.0	24.5	23.5	22.0	22.5	22.0	20.0	21.0
12	21.5	20.5	21.0	25.0	23.0	24.0	23.0	21.5	22.5	22.0	20.5	21.5
13	22.0	20.0	21.0	24.5	23.0	24.0	23.0	21.5	22.5	22.5	21.0	21.5
14	22.0	20.0	21.0	24.0	23.0	23.5	22.5	21.5	22.0	23.0	21.5	22.0
15	21.5	20.5	21.0	24.5	23.0	23.5	23.0	21.5	22.5	22.5	21.0	22.0
16	21.5	20.0	20.5	24.5	23.0	24.0	23.5	22.5	23.0	21.5	20.5	21.0
17	21.0	19.0	20.0	26.0	23.5	25.0	24.0	22.5	23.0	20.5	20.0	20.5
18	21.0	19.5	20.0	26.0	25.0	25.5	24.0	22.0	23.0	20.5	19.5	20.0
19	21.0	19.0	20.0	26.0	25.0	25.5	24.0	23.0	23.5	19.5	18.5	19.5
20	20.5	19.5	20.0	26.5	25.0	26.0	24.5	23.5	24.0	19.5	18.0	19.0
21	20.5	19.0	20.0	26.5	25.0	26.0	24.0	22.5	23.5	18.0	17.5	17.5
22	21.0	19.0	20.0	26.5	25.0	25.5	23.0	22.0	22.5	17.5	16.5	17.0
23	21.0	19.0	20.0	25.5	24.0	25.0	23.5	22.0	22.5	17.5	16.5	17.0
24	21.5	19.0	20.5	26.0	24.5	25.0	23.0	22.0	22.5	17.0	16.5	17.0
25	22.0	20.0	21.0	26.0	24.5	25.5	22.5	21.5	22.0	17.0	16.0	16.5
26	22.0	20.5	21.5	26.5	25.0	25.5	22.0	21.0	21.5	17.0	16.0	16.5
27	23.0	21.5	22.0	26.5	25.5	26.0	21.5	20.5	21.0	16.5	16.0	16.5
28	22.5	22.0	22.5	27.0	23.0	25.0	21.0	19.5	20.5	17.0	16.0	16.5
29	22.5	21.5	22.5	26.5	24.5	25.5	20.5	19.5	20.0	17.5	16.5	17.0
30	23.0	21.5	22.5	26.0	24.5	25.5	20.5	19.5	20.0	18.0	17.0	17.5
31	---	---	---	25.5	24.0	25.0	21.0	20.5	20.5	---	---	---
MONTH				27.0	21.0	24.5	25.5	19.5	23.0	23.0	16.0	19.5

04101698 DOWAGIAC DRAIN AT DECATUR, MI

LOCATION.--Lat 42°05'10", long 85°58'26", in SW¼ sec.29, T.4 S., R.14 W., Van Buren County, Hydrologic Unit 04050001, at bridge on 44th Street, 1.0 mi (1.6 km) south of Decatur.

DRAINAGE AREA.--14.3 mi² (37.0 km²).

PERIOD OF RECORD.--April 1980 to August 1982 (discontinued).

REMARKS.--Water-quality and sediment samples were collected once a month and during high flow for analysis. Discharge measurements were made at time of sampling. All data for period of record is published in this report.

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)
APR , 1980									
24...	1700	27	623	--	8.0	--	--	--	--
OCT									
15...	1040	21	560	--	11.0	--	--	--	1.8
MAR , 1981									
26...	1145	26	540	8.0	6.0	11.5	91	--	2.0
APR									
06...	1115	21	430	7.9	8.0	11.9	99	--	1.9
MAY									
11...	1457	113	608	7.3	8.0	9.6	77	--	7.3
JUN									
08...	1345	23	540	7.9	21.0	8.9	100	--	1.3
JUL									
06...	1255	17	590	7.6	20.5	7.9	88	--	1.3
AUG									
03...	0830	21	530	7.8	18.0	6.8	71	1.9	1.2
SEP									
14...	0845	15	560	7.9	17.5	7.8	81	--	1.5
OCT									
28...	0915	25	640	7.8	6.5	9.7	78	2.6	2.0
NOV									
16...	0830	20	560	8.2	5.5	9.9	78	--	2.0
MAY , 1982									
11...	1145	23	561	7.8	16.0	13.0	133	--	1.7
AUG									
10...	1115	19	536	8.4	17.0	7.2	76	--	--

DATE	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
OCT									
15...	.050	--	1.8	--	.140	--	.32	--	.46
MAR , 1981									
26...	.020	--	2.0	--	.140	--	.57	--	.71
APR									
06...	.020	--	1.9	--	.130	--	.79	--	.92
MAY									
11...	.050	--	7.3	--	.230	--	2.2	--	2.40
JUN									
08...	<.010	--	1.3	--	.060	--	.57	--	.63
JUL									
06...	.040	--	1.3	--	.040	--	.60	--	.64
AUG									
03...	.040	.030	1.2	1.3	.120	.110	1.1	.53	1.20
SEP									
14...	.030	--	1.5	--	.120	--	.48	--	.60
OCT									
28...	.030	.020	2.0	2.0	.080	.080	.38	.56	.46
NOV									
16...	.020	--	2.0	--	.060	--	.32	--	.38
MAY , 1982									
11...	.030	--	1.7	--	.070	--	.92	--	.99
AUG									
10...	--	--	--	--	--	--	--	--	--

STREAMS TRIBUTARY TO LAKE MICHIGAN

04101694 DOWAGIAC DRAIN AT DECATUR, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
APR, 1980								
24...	--	--	--	--	--	--	17	1.2
OCT								
15...	--	2.3	.040	--	.010	--	34	1.9
MAR, 1981								
26...	--	2.7	.060	--	.030	--	60	4.2
APR								
06...	--	2.8	.070	--	.030	--	26	1.5
MAY								
11...	--	9.7	.110	--	.060	--	31	9.5
JUN								
08...	--	1.9	.030	--	.010	--	28	1.7
JUL								
06...	--	1.9	.050	--	.020	--	18	.83
AUG								
03...	.64	2.4	.110	.040	.030	.020	61	3.5
SEP								
14...	--	2.1	.050	--	.030	--	66	2.7
OCT								
28...	.64	2.5	.030	<.010	.020	.010	52	3.5
NOV								
16...	--	2.4	.030	--	.050	--	36	1.9
MAY, 1982								
11...	--	2.7	.050	--	.020	--	31	1.9
AUG								
10...	--	--	--	--	--	--	60	3.1

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)
MAY, 1981												
11...	1457	5.8	80	330	140	92	25	4.3	.1	3	4.6	190

DATE	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ARSENIC TOTAL (UG/L AS AS)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)
MAY, 1981												
11...	100	15	.2	9.7	3.4	481	384	.65	147	2	3	10

DATE	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)
MAY, 1981												
11...	3	3	1600	1	10	130	<.1	10	0	150	150	30

WATER-QUALITY DATA

DATE	TIME	PCB, DIS-SOLVED (UG/L)	PCN DISSOLV (UG/L)	ALDRIN, DIS-SOLVED (UG/L)	AME-TRYNE TOTAL	ATRA-TONE TOTAL (UG/L)	ATRA-ZINE, TOTAL (UG/L)	CHLOR-DANE, DIS-SOLVED (UG/L)	CYAN-AZINE TOTAL (UG/L)	CYPRA-ZINE TOTAL (UG/L)
MAY , 1981										
11...	1457	<.1	<.10	<.01	--	--	--	<.10	--	--
21...	1405	--	--	--	<.10	<.10	<.10	--	<.10	<.10

DATE	DDD, DIS-SOLVED (UG/L)	DDE, DIS-SOLVED (UG/L)	DDT, DIS-SOLVED (UG/L)	DI-AZINON, DIS-SOLVED (UG/L)	DI-ELDRIN DIS-SOLVED (UG/L)	ENDO-SULFAN DISSOLV (UG/L)	ENDRIN, DIS-SOLVED (UG/L)	ETHION DISSOLV (UG/L)	HEPTA-CHLOR, DIS-SOLVED (UG/L)	HEPTA-CHLOR EPOXIDE DIS-SOLVED (UG/L)
MAY , 1981										
11...	<.01	<.01	<.01	<.01	.01	<.01	<.01	<.01	<.01	<.01
21...	--	--	--	--	--	--	--	--	--	--

DATE	LINDANE DIS-SOLVED (UG/L)	MALA-THION, DIS-SOLVED (UG/L)	METH-OXY-CHLOR DISSOLV (UG/L)	METHYL PARA-THION, DIS-SOLVED (UG/L)	METHYL-TRI-THION DISSOLV (UG/L)	MIREX, DIS-SOLVED (UG/L)	PARA-THION, DIS-SOLVED (UG/L)	PER-THANE DISSOLV (UG/L)	PROME-TONE TOTAL (UG/L)	PROME-TRYNE TOTAL (UG/L)
MAY , 1981										
11...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	--	--
21...	--	--	--	--	--	--	--	--	<.1	.1

DATE	PRO-PAZINE TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	SIMA-ZINE TOTAL (UG/L)	SIME-TONE TOTAL (UG/L)	SIME-TRYNE TOTAL (UG/L)	TOX-APHENE, DIS-SOLVED (UG/L)	TRI-THION DISSOLV (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
MAY , 1981										
11...	--	<.01	--	--	--	<1.0	<.01	<.01	<.01	<.01
21...	<.10	--	.00	<.10	<.1	--	--	--	--	--

04101700 DOWAGIAC DRAIN NEAR DECATUR, MI

LOCATION.--Lat 42°04'26", long 86°01'51", in SW¼ sec.35, T.4 S., R.15 W., Van Buren County, Hydrologic Unit 04050001, at bridge on 50th St., 3.7 mi (6.0 km) southwest of Decatur.

DRAINAGE AREA.--21.9 mi² (56.7 km²).

PERIOD OF RECORD.--April 1980 to August 1982 (discontinued).

REMARKS.--Water-quality and sediment samples were collected once a month and during high flow for analysis. Discharge measurements were made at time of sampling. All data for period of record is published in this report.

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
APR , 1980										
24...	1535	45	623	--	8.0	--	--	--	--	--
MAY										
05...	1100	--	--	--	--	--	--	--	--	--
JUN										
02...	1110	39	620	--	16.0	--	--	--	1.7	--
JUL										
07...	0910	51	708	8.0	16.5	6.6	69	--	.82	--
AUG										
04...	1030	30	631	8.0	17.5	6.5	68	--	1.5	--
SEP										
02...	0830	32	558	7.8	17.0	7.2	73	--	1.6	--
OCT										
15...	1140	34	590	--	10.0	--	--	--	1.7	--
DEC										
01...	0900	39	636	6.8	5.0	10.0	78	--	1.8	--
JAN , 1981										
05...	0930	36	660	6.6	.0	--	--	.79	.55	.58
FEB										
02...	1215	40	580	7.6	.0	11.4	78	--	2.2	--
18...	0945	168	654	7.3	3.5	9.0	67	--	12	--
21...	0900	132	693	7.7	4.5	8.0	61	10	9.0	8.70
MAR										
02...	1200	52	600	7.7	5.0	10.3	79	3.6	3.2	3.00
26...	1330	37	550	8.0	6.0	10.7	85	--	1.9	--
APR										
06...	1230	32	570	7.9	7.0	12.0	97	--	1.9	--
MAY										
11...	1635	153	608	7.0	8.0	7.7	67	--	7.2	--
14...	1400	--	--	--	--	--	--	--	--	--
JUN										
08...	1500	31	580	7.6	20.0	7.3	80	--	1.4	--
JUL										
06...	1425	30	600	7.6	20.5	7.3	81	--	1.4	--
AUG										
03...	1015	31	544	7.8	18.5	6.4	67	1.8	1.3	1.30
SEP										
14...	1030	24	585	7.7	17.5	6.5	68	--	1.6	--
OCT										
02...	1145	91	800	--	--	--	--	7.6	7.3	7.10
28...	1105	39	650	7.8	6.5	9.4	76	2.9	2.1	2.10
NOV										
16...	1000	31	600	8.1	5.5	9.5	75	--	1.9	--
DEC										
07...	0945	46	640	7.9	4.5	10.2	79	3.6	3.0	--
JAN , 1982										
28...	0930	36	560	7.8	.5	8.8	60	--	2.2	--
FEB										
16...	0915	35	540	8.0	3.5	--	--	--	2.1	--
MAR										
08...	1300	32	580	8.5	1.0	12.1	83	2.5	2.0	2.10
13...	0945	196	520	7.4	2.0	10.3	74	--	12	--
APR										
19...	0915	54	605	8.0	9.0	9.2	79	--	2.5	--
MAY										
11...	1300	34	588	8.3	16.0	11.0	112	--	1.9	--
JUN										
14...	1115	32	580	8.0	16.0	6.5	66	2.3	1.7	1.70
JUL										
20...	1515	45	600	7.9	23.0	7.4	85	--	--	--
AUG										
10...	1235	25	546	8.1	17.0	6.2	65	--	--	--
16...	1200	22	480	8.0	18.0	7.2	74	--	--	--

04101700 DOWAGIAC DRAIN NEAR DECATUR, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NITRITE DISSOLVED (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
MAY									
05...	--	--	--	--	--	--	--	--	--
JUN									
02...	.000	--	1.7	--	.180	--	.92	--	1.10
JUL									
07...	.010	--	.83	--	1.50	--	--	--	--
AUG									
04...	.080	--	1.6	--	.060	--	.31	--	.37
SEP									
02...	.040	--	1.6	--	.120	--	.53	--	.65
OCT									
15...	.020	--	1.7	--	.150	--	.36	--	.51
DEC									
01...	.020	--	1.8	--	.150	--	.40	--	.55
JAN , 1981									
05...	.010	.020	.56	.60	.040	.040	.24	.15	.28
FEB									
02...	.030	--	2.2	--	.180	--	.38	--	.56
18...	.050	--	12	--	.360	--	1.0	--	1.40
21...	.070	.070	9.1	8.8	.240	.330	1.4	1.1	1.60
MAR									
02...	.020	.020	3.2	3.0	.180	.170	.54	.45	.72
26...	.020	--	1.9	--	.190	--	.42	--	.61
APR									
06...	.020	--	1.9	--	.110	--	.62	--	.73
MAY									
11...	.050	--	7.2	--	.140	--	1.8	--	1.90
14...	--	--	--	--	--	--	--	--	--
JUN									
08...	.040	--	1.4	--	.130	--	.47	--	.60
JUL									
06...	.050	--	1.4	--	.070	--	.81	--	.88
AUG									
03...	.040	.040	1.3	1.3	.120	.100	.82	.38	.94
SEP									
14...	.030	--	1.6	--	.090	--	.62	--	.71
OCT									
02...	.080	.080	7.4	7.2	.180	.150	1.2	.29	1.40
28...	.030	.040	2.1	2.1	.070	.070	.53	.68	.60
NOV									
16...	.020	--	1.9	--	.080	--	.39	--	.47
DEC									
07...	.030	.030	3.0	3.0	.130	.140	.44	.48	.57
JAN , 1982									
28...	.030	--	2.2	--	.200	--	.66	--	.86
FEB									
16...	.040	--	2.1	--	.210	--	.30	--	.51
MAR									
08...	.020	.010	2.0	2.1	.160	.160	.39	.26	.55
13...	.030	--	12	--	.300	--	1.5	--	1.80
APR									
19...	.020	--	2.5	--	.110	--	.51	--	.62
MAY									
11...	.050	--	1.9	--	.070	--	1.1	--	1.20
JUN									
14...	.030	.030	1.7	1.7	.040	.060	.94	.54	1.00
JUL									
20...	--	--	--	--	--	--	--	--	--
AUG									
10...	--	--	--	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--	--

04101700 DOWAGIAC DRAIN NEAR DECATUR, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
APR , 1980									
24...	--	--	--	--	--	--	--	14	1.7
MAY									
05...	--	--	--	--	--	--	--	22	--
JUN									
02...	--	--	2.8	.130	--	.040	--	63	6.6
JUL									
07...	--	--	--	--	--	1.00	--	71	9.8
AUG									
04...	--	--	2.0	.080	--	.040	--	53	4.3
SEP									
02...	--	--	2.3	.120	--	.020	--	42	3.6
OCT									
15...	--	--	2.2	.050	--	.010	--	33	3.0
DEC									
01...	--	--	2.4	.050	--	.040	--	20	2.1
JAN , 1981									
05...	--	.19	.84	.010	.000	.000	.010	12	1.2
FEB									
02...	--	--	2.8	.050	--	.030	--	11	1.2
18...	--	--	13	.160	--	.100	--	39	18
21...	--	1.4	11	.090	.040	.040	.030	23	8.2
MAR									
02...	.10	.62	3.9	.040	.010	.020	.010	17	2.4
26...	--	--	2.5	.110	--	.040	--	19	1.9
APR									
06...	--	--	2.6	.060	--	.020	--	15	1.3
MAY									
11...	--	--	9.1	.110	--	.060	--	27	11
14...	--	--	--	--	--	--	--	30	--
JUN									
08...	--	--	2.0	.050	--	.030	--	53	4.4
JUL									
06...	--	--	2.3	.070	--	.020	--	43	3.5
AUG									
03...	--	.48	2.2	.070	.050	.030	<.010	45	3.8
SEP									
14...	--	--	2.3	.050	--	.030	--	60	3.9
OCT									
02...	--	.44	8.8	.050	.030	.020	.020	19	4.7
28...	--	.75	2.7	.020	<.010	.010	<.010	46	4.8
NOV									
16...	--	--	2.4	.040	--	.050	--	9	.75
DEC									
07...	--	.62	3.6	.040	.020	.040	.010	12	1.5
JAN , 1982									
28...	--	--	3.1	.030	--	.010	--	15	1.5
FEB									
16...	--	--	2.6	.030	--	.020	--	12	1.1
MAR									
08...	.13	.42	2.6	.030	.010	.020	<.010	11	.95
13...	--	--	14	.180	--	.080	--	97	51
APR									
19...	--	--	3.1	.050	--	.020	--	18	2.6
MAY									
11...	--	--	3.1	.090	--	.040	--	32	2.9
JUN									
14...	.40	.60	2.7	.100	.020	.030	.010	62	5.4
JUL									
20...	--	--	--	--	--	--	--	47	5.7
AUG									
10...	--	--	--	--	--	--	--	43	2.9
16...	--	--	--	--	--	--	--	26	1.5

WATER-QUALITY DATA

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)
MAY , 1981											
11...	1635	4.2	75	340	160	96	24	4.9	.1	3	4.6
AUG , 1982											
16...	1200	6.8	25	270	37	67	25	5.7	.2	4	1.1

DATE	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)
MAY , 1981											
11...	180	100	14	.2	9.5	3.4	--	381	.52	157	--
AUG , 1982											
16...	233	57	8.0	.2	9.7	--	369	314	.50	21.9	80

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BORON, TOTAL RECOVERABLE (UG/L AS B)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)
MAY , 1981											
11...	2	--	--	2	20	2	2	1100	--	1	8
AUG , 1982											
16...	3	100	90	--	10	3	6	810	35	2	--

DATE	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
MAY , 1981										
11...	110	--	<.1	9	0	160	180	30	--	--
AUG , 1982										
16...	80	48	--	1	--	180	--	10	<.01	<1

STREAMS TRIBUTARY TO LAKE MICHIGAN

04101700 DOWAGIAC DRAIN NEAR DECATUR, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	PCB, DIS-SOLVED (UG/L)	PCN DISSOLV (UG/L)	ALDRIN, DIS-SOLVED (UG/L)	AME-TRYNE TOTAL	ATRA-TONE TOTAL (UG/L)	ATRA-ZINE, TOTAL (UG/L)	CHLOR-DANE, DIS-SOLVED (UG/L)	CYAN-AZINE TOTAL (UG/L)	CYPRA-ZINE TOTAL (UG/L)
MAY , 1981										
11...	1635	<.1	<.10	<.01	--	--	--	<.10	--	--
21...	1425	--	--	--	<.10	<.10	<.10	--	<.10	<.10

DATE	DDD, DIS-SOLVED (UG/L)	DDE, DIS-SOLVED (UG/L)	DDT, DIS-SOLVED (UG/L)	DI-AZINON, DIS-SOLVED (UG/L)	DI-ELDRIN DIS-SOLVED (UG/L)	ENDO-SULFAN DISSOLV (UG/L)	ENDRIN, DIS-SOLVED (UG/L)	ETHION DISSOLV (UG/L)	HEPTA-CHLOR, DIS-SOLVED (UG/L)	HEPTA-CHLOR EPOXIDE DIS-SOLVED (UG/L)
MAY , 1981										
11...	<.01	<.01	<.01	<.01	.01	<.01	<.01	<.01	<.01	<.01
21...	--	--	--	--	--	--	--	--	--	--

DATE	LINDANE DIS-SOLVED (UG/L)	MALA-THION, DIS-SOLVED (UG/L)	METH-OXY-CHLOR DISSOLV (UG/L)	METHYL PARA-THION, DIS-SOLVED (UG/L)	METHYL-TRI-THION DISSOLV (UG/L)	MIREX, DIS-SOLVED (UG/L)	PARA-THION, DIS-SOLVED (UG/L)	PER-THANE DISSOLV (UG/L)	PROME-TONE TOTAL (UG/L)	PROME-TRYNE TOTAL (UG/L)
MAY , 1981										
11...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	--	--
21...	--	--	--	--	--	--	--	--	<.1	.4

DATE	PRO-PAZINE TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	SIMA-ZINE TOTAL (UG/L)	SIME-TONE TOTAL (UG/L)	SIME-TRYNE TOTAL (UG/L)	TOX-APHENE, DIS-SOLVED (UG/L)	TRI-THION DISSOLV (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
MAY , 1981										
11...	--	<.01	--	--	--	<1.0	<.01	<.01	<.01	<.01
21...	<.10	--	.10	<.10	<.1	--	--	--	--	--

04101710 LAKE OF THE WOODS DRAIN NEAR DECATUR, MI

LOCATION.--Lat 42°05'05", long 86°02'17", in NE¼ sec.34, T.4 S., R.15 W., Van Buren County, Hydrologic Unit 04050001, at culvert at 92nd Ave., 3.5 mi (5.6 km) southwest of Decatur.

DRAINAGE AREA.--13.1 mi² (33.9 km²).

PERIOD OF RECORD.--September 1980 to August 1982 (discontinued).

REMARKS.--Water-quality and sediment samples were collected once a month and during high flow for analysis. Discharge measurements were made at time of sampling. All data for period of record is published in this report.

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
APR , 1980										
24...	1415	18	441	--	9.0	--	--	--	--	--
MAY										
07...	0830	12	455	--	10.0	--	--	--	--	--
JUN										
02...	1245	14	428	--	18.0	--	--	--	.90	--
JUL										
07...	1100	21	410	8.1	18.5	7.2	--	--	.63	--
AUG										
04...	1150	13	410	7.8	20.0	6.4	70	--	.54	--
SEP										
02...	1000	13	402	7.8	19.0	6.2	66	--	.64	--
OCT										
15...	1250	9.5	410	--	11.0	--	--	--	.95	--
DEC										
01...	1030	13	456	6.8	4.0	11.2	85	--	.81	--
JAN , 1981										
05...	1130	12	451	7.7	.5	--	--	1.3	.78	.77
FEB										
02...	1315	14	400	7.8	.5	12.4	86	--	.84	--
18...	1145	45	418	7.4	3.5	9.6	71	--	4.0	--
MAR										
02...	1300	25	380	7.5	4.5	9.8	75	2.0	1.4	1.50
APR										
06...	1315	12	410	7.9	10.5	12.0	100	--	.99	--
MAY										
11...	1750	51	377	7.0	9.5	8.6	107	--	1.9	--
14...	1410	--	--	--	--	--	--	--	--	--
JUN										
09...	0830	11	400	7.7	16.0	6.0	62	--	.78	--
JUL										
06...	1535	8.1	440	7.6	20.5	8.0	89	--	.94	--
AUG										
03...	1145	10	450	7.7	19.5	6.4	68	1.4	.80	.77
SEP										
14...	1130	--	430	7.8	18.5	6.5	69	--	.78	--
OCT										
02...	1300	23	460	--	--	--	--	2.2	1.2	1.20
28...	1241	13	430	7.7	9.5	9.6	83	1.6	.98	.97
NOV										
16...	1115	8.5	440	8.0	7.0	9.3	77	--	1.1	--
DEC										
07...	1100	16	420	7.9	5.0	10.7	85	1.4	.95	.97
FEB , 1982										
16...	1030	12	405	7.9	5.0	--	--	--	1.1	--
MAR										
08...	1410	14	360	7.9	2.0	12.0	85	1.3	.85	.85
13...	1115	68	345	7.5	2.5	10.3	75	--	4.6	--
APR										
19...	1030	24	430	8.2	10.0	11.0	97	--	.99	--
MAY										
11...	1430	13	402	8.0	20.0	9.7	108	--	.97	--
JUN										
14...	1215	9.7	420	8.0	17.5	6.7	69	1.5	.98	.98
JUL										
20...	1630	16	395	8.1	25.5	6.6	78	--	--	--
AUG										
10...	1325	6.7	394	8.3	18.0	8.2	86	--	--	--
16...	1400	5.5	375	8.2	20.0	9.8	105	--	--	--

04101710 LAKE OF THE WOODS DRAIN NEAR DECATUR, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
MAY									
07...	--	--	--	--	--	--	--	--	--
JUN									
02...	.010	--	.91	--	.110	--	.61	--	.72
JUL									
07...	.040	--	.67	--	.040	--	.43	--	.47
AUG									
04...	.020	--	.56	--	.010	--	.23	--	.24
SEP									
02...	.010	--	.65	--	.050	--	.54	--	.59
OCT									
15...	.030	--	.98	--	.120	--	.38	--	.50
DEC									
01...	.020	--	.83	--	.110	--	.69	--	.80
JAN , 1981									
05...	.020	.020	.80	.79	.090	.090	.42	.42	.51
FEB									
02...	.010	--	.85	--	.100	--	.37	--	.47
18...	.030	--	4.0	--	.140	--	.82	--	.96
MAR									
02...	.010	.020	1.4	1.5	.140	.090	.26	.41	.40
APR									
06...	.010	--	1.0	--	.080	--	.50	--	.58
MAY									
11...	.020	--	1.9	--	.060	--	1.1	--	1.20
14...	--	--	--	--	--	--	--	--	--
JUN									
09...	.010	--	.79	--	.170	--	.43	--	.60
JUL									
06...	.020	--	.96	--	.050	--	.69	--	.74
AUG									
03...	.030	.020	.82	.82	.100	.100	.88	.48	.98
SEP									
14...	.030	--	.81	--	.090	--	.54	--	.63
OCT									
02...	.020	.020	1.2	1.2	.110	.100	.80	.90	.91
28...	.020	.020	1.0	.99	.070	.060	.68	.57	.75
NOV									
16...	.020	--	1.1	--	.070	--	.45	--	.52
DEC									
07...	.010	.010	.96	.98	.090	.080	.62	.36	.71
FEB , 1982									
16...	.020	--	1.1	--	.110	--	2.4	--	2.50
MAR									
08...	<.010	<.010	.85	.85	.070	.070	.27	.39	.34
13...	.020	--	4.6	--	.150	--	.85	--	1.00
APR									
19...	.010	--	1.0	--	.070	--	.57	--	.64
MAY									
11...	.030	--	1.0	--	.050	--	1.1	--	1.10
JUN									
14...	.020	.020	1.0	1.0	.060	.060	.74	.44	.80
JUL									
20...	--	--	--	--	--	--	--	--	--
AUG									
10...	--	--	--	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--	--

WATER-QUALITY DATA

DATE	NITROGEN,NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITROGEN,AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
APR , 1980									
24...	--	--	--	--	--	--	--	6	.29
MAY									
07...	--	--	--	--	--	--	--	9	.29
JUN									
02...	--	--	1.6	.040	--	.010	--	21	.79
JUL									
07...	--	--	1.1	.020	--	.030	--	--	--
AUG									
04...	--	--	.80	.030	--	.000	--	16	.56
SEP									
02...	--	--	1.2	.040	--	.000	--	14	.49
OCT									
15...	--	--	1.5	.030	--	.000	--	11	.28
DEC									
01...	--	--	1.6	.010	--	.010	--	14	.49
JAN , 1981									
05...	--	.51	1.3	.020	.010	.020	.000	6	.20
FEB									
02...	--	--	1.3	.020	--	<.010	--	3	.11
18...	--	--	5.0	.060	--	.040	--	20	2.4
MAR									
02...	.00	.50	1.8	.010	.020	<.010	<.010	6	.40
APR									
06...	--	--	1.6	.030	--	.020	--	4	.13
MAY									
11...	--	--	3.1	.080	--	.030	--	14	1.9
14...	--	--	--	--	--	--	--	88	--
JUN									
09...	--	--	1.4	.020	--	<.010	--	26	.77
JUL									
06...	--	--	1.7	.050	--	.030	--	15	.33
AUG									
03...	--	.58	1.8	.050	.010	.020	<.010	30	.81
SEP									
14...	--	--	1.4	.040	--	.020	--	10	--
OCT									
02...	--	1.0	2.1	.030	<.010	<.010	.010	10	.62
28...	--	.63	1.8	<.010	<.010	<.010	<.010	4	.14
NOV									
16...	--	--	1.6	.040	--	.040	--	7	.16
DEC									
07...	--	.44	1.7	.020	.030	.030	<.010	2	.09
FEB , 1982									
16...	--	--	3.6	.010	--	<.010	--	0	.00
MAR									
08...	.00	.46	1.2	.010	<.010	<.010	<.010	4	.15
13...	--	--	5.6	.100	--	.070	--	15	2.8
APR									
19...	--	--	1.6	.020	--	<.010	--	7	.45
MAY									
11...	--	--	2.1	.020	--	<.010	--	3	.11
JUN									
14...	.30	.50	1.8	.050	.010	.010	<.010	26	.68
JUL									
20...	--	--	--	--	--	--	--	16	.69
AUG									
10...	--	--	--	--	--	--	--	6	.11
16...	--	--	--	--	--	--	--	3	.04

04101710 LAKE OF THE WOODS DRAIN NEAR DECATUR, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)
MAY , 1981											
11...	1750	3.0	45	190	22	48	17	4.6	.1	5	2.0
AUG , 1982											
16...	1400	1.2	18	200	30	50	18	6.5	.2	7	1.1

DATE	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)
MAY , 1981											
11...	1.0	36	12	.1	4.9	1.5	270	226	.37	37.2	--
AUG , 1982											
16...	169	40	9.1	.1	9.1	--	295	236	.40	4.4	30

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BORON, TOTAL RECOVERABLE (UG/L AS B)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)
MAY , 1981											
11...	2	--	--	2	10	2	2	600	--	1	6
AUG , 1982											
16...	3	100	100	--	10	3	5	340	31	3	--

DATE	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
MAY , 1981										
11...	60	--	<.1	8	0	90	80	20	--	--
AUG , 1982										
16...	40	27	--	1	--	140	--	10	<.01	<1

04101710 LAKE OF THE WOODS DRAIN NEAR DECATUR, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	PCB, DIS-SOLVED (UG/L)	PCN DISSOLV (UG/L)	ALDRIN, DIS-SOLVED (UG/L)	AME-TRYNE TOTAL	ATRA-TONE TOTAL (UG/L)	ATRA-ZINE, TOTAL (UG/L)	CHLOR-DANE, DIS-SOLVED (UG/L)	CYAN-AZINE TOTAL (UG/L)	CYPRA-ZINE TOTAL (UG/L)
MAY , 1981										
11...	1750	<.1	<.10	<.01	--	--	--	<.10	--	--
21...	1435	--	--	--	<.10	<.10	<.10	--	<.10	<.10

DATE	DDD, DIS-SOLVED (UG/L)	DDE, DIS-SOLVED (UG/L)	DDT, DIS-SOLVED (UG/L)	DI-AZINON, DIS-SOLVED (UG/L)	DI-ELDRIN DIS-SOLVED (UG/L)	ENDO-SULFAN DISSOLV (UG/L)	ENDRIN, DIS-SOLVED (UG/L)	ETHION DISSOLV (UG/L)	HEPTA-CHLOR, DIS-SOLVED (UG/L)	HEPTA-CHLOR EPOXIDE DIS-SOLVED (UG/L)
MAY , 1981										
11...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
21...	--	--	--	--	--	--	--	--	--	--

DATE	LINDANE DIS-SOLVED (UG/L)	MALA-THION, DIS-SOLVED (UG/L)	METH-OXY-CHLOR DISSOLV (UG/L)	METHYL PARA-THION, DIS-SOLVED (UG/L)	METHYL-TRI-THION DISSOLV (UG/L)	MIREX, DIS-SOLVED (UG/L)	PARA-THION, DIS-SOLVED (UG/L)	PER-THANE DISSOLV (UG/L)	PROME-TONE TOTAL (UG/L)	PROME-TRYNE TOTAL (UG/L)
MAY , 1981										
11...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	--	--
21...	--	--	--	--	--	--	--	--	<.1	.0

DATE	PRO-PAZINE TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	SIMA-ZINE TOTAL (UG/L)	SIME-TONE TOTAL (UG/L)	SIME-TRYNE TOTAL (UG/L)	TOX-APHENE, DIS-SOLVED (UG/L)	TRI-THION DISSOLV (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
MAY , 1981										
11...	--	<.01	--	--	--	<1.0	<.01	.15	<.01	<.01
21...	<.10	--	.02	<.10	<.1	--	--	--	--	--

04101800 DOWAGIAC RIVER AT SUMMERVILLE, MI

LOCATION.--Lat 41°54'57", long 86°12'47", in SE¼ sec.30, T.6 S., R.16 W., Cass County, Hydrologic Unit 04050001, on right bank 30 ft (9 m) upstream from bridge on Indian Lake Road, 0.3 mi (0.5 km) west of Summerville.

DRAINAGE AREA.--255 mi² (660 km²).

PERIOD OF RECORD.--October 1960 to current year.

GAGE.--Water-stage recorder. Datum of gage is 692.62 ft (211.111 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated by millpond and lake-level control dam above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 285 ft³/s (8.071 m³/s), 15.18 in/yr (386 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,280 ft³/s (36.2 m³/s) June 26, 1968, gage height, 8.78 ft (2.676 m); minimum, 86 ft³/s (2.44 m³/s) Sept. 10, 1964; minimum gage height, 2.57 ft (0.783 m) Aug. 8, 9, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,150 ft³/s (32.6 m³/s) Mar. 17, gage height, 8.33 ft (2.539 m); minimum, 159 ft³/s (4.50 m³/ s) Sept. 12, 13, gage height, 3.28 ft (1.000 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	541	257	389	282	295	289	769	356	514	264	227	184
2	495	255	387	280	302	296	642	348	493	254	247	182
3	437	250	364	303	297	290	658	342	431	318	242	178
4	394	248	378	469	291	282	641	338	408	333	232	174
5	365	250	380	541	287	303	613	332	384	301	230	170
6	343	259	355	489	277	296	572	329	360	279	228	169
7	328	255	343	427	247	287	574	347	346	275	220	179
8	313	251	334	375	278	278	563	359	333	265	264	178
9	302	246	333	347	278	276	568	339	323	250	256	170
10	293	243	330	242	265	284	597	328	323	255	232	167
11	285	241	319	303	284	352	593	320	308	368	224	165
12	279	240	314	316	266	451	584	311	300	341	218	161
13	275	238	309	324	259	805	573	306	291	307	212	162
14	275	238	308	326	260	1050	538	296	281	321	206	166
15	295	237	306	316	273	1040	505	291	294	363	202	172
16	287	238	300	289	291	1040	487	305	300	326	198	175
17	281	238	294	228	295	1140	515	290	290	456	189	179
18	362	238	287	264	295	1030	503	282	282	437	183	245
19	422	241	289	288	301	903	475	327	317	417	178	226
20	391	407	283	286	303	945	460	312	311	408	193	214
21	355	522	277	274	314	966	441	316	306	362	189	219
22	348	461	299	267	316	846	431	597	304	334	184	215
23	336	392	299	269	317	787	417	676	294	315	188	209
24	317	366	288	228	329	749	405	526	282	297	186	203
25	305	347	282	264	320	703	394	453	272	281	207	200
26	294	365	285	282	306	635	392	417	267	269	200	198
27	287	614	285	288	301	578	383	508	266	261	194	199
28	278	541	284	289	292	544	372	659	263	282	189	198
29	273	443	282	283	---	533	365	513	285	260	185	192
30	267	395	271	303	---	577	359	461	284	244	184	188
31	263	---	278	303	---	877	---	429	---	235	184	---
TOTAL	10286	9516	9732	9745	8139	19452	15389	12013	9712	9678	6471	5637
MEAN	332	317	314	314	291	627	513	388	324	312	209	188
MAX	541	614	389	541	329	1140	769	676	514	456	264	245
MIN	263	237	271	228	247	276	359	282	263	235	178	161
CFSM	1.30	1.24	1.23	1.23	1.14	2.46	2.01	1.52	1.27	1.22	.82	.74
IN.	1.50	1.39	1.42	1.42	1.19	2.84	2.24	1.75	1.42	1.41	.94	.82

CAL YR 1981 TOTAL 122027 MEAN 334 MAX 1000 MIN 170 CFSM 1.31 IN 17.80
WTR YR 1982 TOTAL 125770 MEAN 345 MAX 1140 MIN 161 CFSM 1.35 IN 18.35

04102148 SOUTH BRANCH PAW PAW RIVER NEAR PAW PAW, MI

LOCATION.--Lat 42°12'02", long 85°54'05", in NE¼ sec.23, T.3 S., R.14 W., Van Buren County, Hydrologic Unit 04050001, at 60th Ave., 1.4 mi (2.3 km) south of Paw Paw.

DRAINAGE AREA.--51.2 mi² (132.6 km²).

PERIOD OF RECORD.--April 1980 to August 1982 (discontinued).

REMARKS.--Water-quality and sediment samples were collected on a once a month basis, and during high flow for analysis. Discharge measurements were made at time of sampling. All data for period of record is published in this report.

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
APR , 1980										
23...	1310	76	594	--	12.0	--	--	--	--	--
MAY										
08...	0830	65	561	--	8.0	--	--	--	--	--
JUN										
02...	1440	66	552	--	14.0	--	--	--	1.1	--
JUL										
07...	1330	74	551	7.9	14.5	7.6	78	--	1.2	--
AUG										
04...	1355	90	545	7.7	16.0	7.4	78	--	.93	--
SEP										
02...	1200	88	540	7.7	15.5	7.9	77	--	--	--
OCT										
14...	1520	61	480	--	10.5	--	--	--	.98	--
DEC										
01...	1230	76	594	6.9	6.0	11.2	89	--	1.1	--
JAN , 1981										
05...	1400	59	574	7.5	1.0	--	--	1.6	1.2	1.20
FEB										
02...	1430	68	550	7.9	1.5	11.1	78	--	1.2	--
18...	1330	239	1020	7.5	4.0	9.3	70	--	3.0	--
21...	1100	164	559	7.8	5.0	9.4	72	2.6	2.0	1.90
MAR										
02...	1350	88	525	7.6	6.0	8.9	71	1.8	1.6	1.40
APR										
06...	1415	65	560	7.8	9.0	11.2	93	--	1.1	--
MAY										
12...	1305	188	540	7.2	8.0	9.0	78	--	1.4	--
14...	1440	--	--	--	--	--	--	--	--	--
JUN										
09...	1015	59	540	8.0	16.0	7.9	81	--	1.1	--
JUL										
07...	1340	44	550	8.0	20.0	8.3	92	--	.98	--
AUG										
03...	1345	50	495	7.8	17.0	8.1	83	1.4	.91	.90
SEP										
14...	1330	42	520	7.8	17.0	7.9	81	--	1.2	--
OCT										
02...	1500	111	650	--	--	--	--	2.4	1.4	1.40
27...	1630	66	590	7.8	11.0	9.0	81	1.8	1.2	1.20
NOV										
16...	1300	51	530	8.0	7.5	9.5	79	--	1.2	--
DEC										
07...	1315	71	545	8.0	7.0	9.8	81	1.6	1.3	1.30
JAN , 1982										
18...	1330	63	530	7.4	.5	10.1	69	--	1.2	--
FEB										
16...	1210	64	530	7.9	5.5	--	--	--	1.1	--
MAR										
08...	1530	58	530	7.9	2.0	12.2	86	1.5	1.1	1.10
16...	0900	269	460	7.7	4.5	9.4	73	--	2.3	--
APR										
19...	1200	91	560	8.0	10.0	11.6	103	--	1.2	--
MAY										
12...	1315	60	552	7.5	14.5	9.6	96	--	1.1	--
JUN										
14...	1330	50	560	8.3	14.5	9.0	88	1.7	1.1	1.20
JUL										
21...	0915	98	560	7.8	16.5	6.9	70	--	1.1	--
AUG										
11...	0900	49	585	7.7	11.0	8.5	78	--	--	--
17...	0830	41	480	8.0	15.0	7.6	73	--	--	--

04102148 SOUTH BRANCH PAW PAW RIVER NEAR PAW PAW, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NITRITE DISSOLVED (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)
APR , 1980									
23...	--	--	--	--	--	--	--	--	--
MAY									
08...	--	--	--	--	--	--	--	--	--
JUN									
02...	.020	--	1.1	--	.080	--	.43	--	.43
JUL									
07...	.060	--	1.3	--	.020	--	.47	--	.49
AUG									
04...	.040	--	.97	--	.060	--	.65	--	.71
SEP									
02...	--	--	--	--	--	--	--	--	--
OCT									
14...	.020	--	1.0	--	.050	--	.18	--	.23
DEC									
01...	.020	--	1.1	--	.070	--	.35	--	.42
JAN , 1981									
05...	.020	.030	1.2	1.2	.180	.180	.19	.26	.37
FEB									
02...	.010	--	1.2	--	.130	--	.27	--	.40
18...	.030	--	3.0	--	.220	--	.76	--	.98
21...	.020	.020	2.0	1.9	.120	.110	.79	.59	.91
MAR									
02...	.010	.020	1.6	1.4	.170	.120	.38	.28	.55
APR									
06...	.020	--	1.1	--	.160	--	.54	--	.70
MAY									
12...	.020	--	1.4	--	.120	--	.98	--	1.10
14...	--	--	--	--	--	--	--	--	--
JUN									
09...	.040	--	1.1	--	.380	--	.37	--	.75
JUL									
07...	.020	--	1.0	--	.010	--	.42	--	.43
AUG									
03...	.030	.030	.94	.93	.080	.080	.42	.36	.50
SEP									
14...	.040	--	1.2	--	.070	--	.37	--	.44
OCT									
02...	.040	.040	1.4	1.4	.190	.180	.74	.80	.93
27...	.020	.020	1.2	1.2	.070	.080	.39	.49	.46
NOV									
16...	.020	--	1.2	--	.090	--	.28	--	.37
DEC									
07...	.010	.020	1.3	1.3	.110	.110	.33	.23	.44
JAN , 1982									
18...	.010	--	1.2	--	.150	--	.32	--	.47
FEB									
16...	.030	--	1.1	--	.130	--	14	--	14.0
MAR									
08...	.010	<.010	1.1	1.1	.120	.110	.34	.26	.46
16...	.020	--	2.3	--	.140	--	.75	--	.89
APR									
19...	.020	--	1.2	--	.150	--	.58	--	.73
MAY									
12...	.030	--	1.1	--	.070	--	.93	--	1.00
JUN									
14...	.030	.030	1.1	1.2	.050	.040	.25	.46	.30
JUL									
21...	.060	--	1.2	--	.150	--	.75	--	.90
AUG									
11...	--	--	--	--	--	--	--	--	--
17...	--	--	--	--	--	--	--	--	--

WATER-QUALITY DATA

DATE	NITROGEN,NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITROGEN,AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
APR , 1980									
23...	--	--	--	--	--	--	--	15	3.1
MAY									
08...	--	--	--	--	--	--	--	20	3.5
JUN									
02...	--	--	1.5	.020	--	.010	--	27	--
JUL									
07...	--	--	1.8	.020	--	.020	--	26	5.2
AUG									
04...	--	--	1.7	.050	--	.000	--	26	6.3
SEP									
02...	--	--	--	--	--	--	--	--	--
OCT									
14...	--	--	1.2	.030	--	.000	--	46	7.6
DEC									
01...	--	--	1.5	.020	--	.010	--	24	4.9
JAN , 1981									
05...	--	.44	1.6	.020	--	.010	--	12	1.9
FEB									
02...	--	--	1.6	.030	--	.010	--	9	1.7
18...	--	--	4.0	.060	--	.030	--	28	18
21...	--	.70	2.9	.030	.010	<.010	.010	19	8.4
MAR									
02...	.15	.40	2.2	.020	<.010	<.010	<.010	11	2.6
APR									
06...	--	--	1.8	.120	--	.080	--	7	1.2
MAY									
12...	--	--	2.5	.050	--	<.010	--	19	9.6
14...	--	--	--	--	--	--	--	20	--
JUN									
09...	--	--	1.9	.050	--	.020	--	18	2.9
JUL									
07...	--	--	1.4	.020	--	<.010	--	14	1.7
AUG									
03...	--	.44	1.4	.030	<.010	.010	.010	23	3.1
SEP									
14...	--	--	1.6	.030	--	.020	--	17	1.9
OCT									
02...	--	.98	2.3	.020	<.010	.040	.020	9	2.7
27...	--	.57	1.7	.070	.030	.060	.040	13	2.3
NOV									
16...	--	--	1.6	.020	--	.040	--	9	1.2
DEC									
07...	--	.34	1.7	.030	.010	.050	.030	10	1.9
JAN , 1982									
18...	--	--	1.7	--	--	<.010	--	22	3.7
FEB									
16...	--	--	15	<.010	--	<.010	--	8	1.4
MAR									
08...	.09	.37	1.6	.030	<.010	.010	.010	9	1.4
16...	--	--	3.2	.050	--	.030	--	17	12
APR									
19...	--	--	1.9	.110	--	.090	--	6	1.5
MAY									
12...	--	--	2.1	.020	--	.010	--	19	3.1
JUN									
14...	.00	.50	1.4	.020	.040	.010	.020	18	2.4
JUL									
21...	--	--	2.1	.050	--	.040	--	24	6.4
AUG									
11...	--	--	--	--	--	--	--	14	1.9
17...	--	--	--	--	--	--	--	12	1.3

04102148 SOUTH BRANCH PAW PAW RIVER NEAR PAW PAW, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)
MAY , 1981											
12...	1305	3.0	42	280	80	74	23	9.1	.2	7	1.7
AUG , 1982											
17...	0830	3.0	17	260	34	66	22	17	.5	13	1.9

DATE	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)
MAY , 1981											
12...	200	66	16	.2	11	1.3	355	321	.48	180	--
AUG , 1982											
17...	221	42	24	.2	10	--	377	316	.51	41.7	90

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BORON, TOTAL RECOVERABLE (UG/L AS B)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)
MAY , 1981											
12...	2	--	--	1	10	1	6	1000	--	4	5
AUG , 1982											
17...	3	200	50	--	20	2	110	770	6	6	--

DATE	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
MAY , 1981										
12...	70	--	<.1	9	0	110	110	30	--	--
AUG , 1982										
17...	70	40	--	3	--	120	--	<10	<.01	<1

04182148 SOUTH BRANCH PAW PAW RIVER NEAR PAW PAW, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	PCB, DIS-SOLVED (UG/L)	PCN DISSOLV (UG/L)	ALDRIN, DIS-SOLVED (UG/L)	CHLOR-DANE, DIS-SOLVED (UG/L)	DDD, DIS-SOLVED (UG/L)	DDE, DIS-SOLVED (UG/L)	DDT, DIS-SOLVED (UG/L)	DI-AZINON, DIS-SOLVED (UG/L)	DI-ELDRIN DIS-SOLVED (UG/L)	ENDO-SULFAN DISSOLV (UG/L)
MAY , 1981											
12...	1305	<.1	<.10	<.01	<.10	<.01	<.01	<.01	<.01	<.01	<.01
AUG , 1982											
17...	0830	--	--	--	--	--	--	--	--	--	--

DATE	ENDRIN, DIS-SOLVED (UG/L)	ETHION DISSOLV (UG/L)	HEPTA-CHLOR, DIS-SOLVED (UG/L)	HEPTA-CHLOR EPOXIDE DIS-SOLVED (UG/L)	LINDANE DIS-SOLVED (UG/L)	MALA-THION, DIS-SOLVED (UG/L)	METHO-NYL TOTAL (UG/L)	METH-OXY-CHLOR DISSOLV (UG/L)	METHYL PARA-THION, DIS-SOLVED (UG/L)	METHYL-TRI-THION DISSOLV (UG/L)	MIREX, DIS-SOLVED (UG/L)
MAY , 1981											
12...	<.01	<.01	<.01	<.01	<.01	<.01	.0	<.01	<.01	<.01	<.01
AUG , 1982											
17...	--	--	--	--	--	--	--	--	--	--	--

DATE	PARA-THION, DIS-SOLVED (UG/L)	PER-THANE DISSOLV (UG/L)	PROPHAM TOTAL (UG/L)	SEVIN, TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	TOX-APHENE, DIS-SOLVED (UG/L)	TRI-THION DISSOLV (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
MAY , 1981										
12...	<.01	<.01	.0	.00	<.01	<1.0	<.01	<.01	<.01	<.01
AUG , 1982										
17...	--	--	--	--	<.01	--	--	<.01	<.01	<.01

04102178 EAST BRANCH PAW PAW RIVER NEAR LAWTON, MI

LOCATION.--Lat 42°41'50", long 85°50'33", in NW¼ sec.21, T.3 S., R.13 W., Van Buren County, Hydrologic Unit 04050001, at 30th St., 1.5 mi (2.4 km) north of Lawton.

DRAINAGE AREA.--26.9 mi² (69.7 km²).

PERIOD OF RECORD.--April 1980 to August 1982 (discontinued).

REMARKS.--Water-quality and sediment samples were collected once a month and during high flow for analysis. Discharge measurements were made at time of sampling. All data for period of record is published in this report.

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
APR , 1980										
23...	1435	26	399	--	14.0	--	--	--	--	--
MAY										
08...	1015	23	410	--	10.0	--	--	--	--	--
JUN										
02...	1635	31	406	--	16.0	--	--	--	.30	--
JUL										
07...	1445	24	388	7.8	19.0	8.8	97	--	.35	--
AUG										
04...	1540	42	371	8.0	20.5	7.8	88	--	.18	--
SEP										
02...	1330	48	372	8.0	19.0	8.1	85	--	.20	--
OCT										
14...	1330	22	425	--	9.0	--	--	--	.40	--
DEC										
01...	1345	30	404	7.1	6.0	12.3	98	--	.44	--
JAN , 1981										
06...	0930	24	457	7.5	2.0	11.7	84	2.4	2.0	1.90
FEB										
02...	1550	22	398	8.0	2.5	11.8	85	--	.57	--
MAR										
02...	1525	30	390	7.7	5.5	10.0	78	.93	.52	.57
APR										
06...	1540	24	415	7.9	10.5	11.6	97	--	.47	--
MAY										
11...	2000	84	280	7.6	8.5	10.4	87	--	.16	--
14...	1455	--	--	--	--	--	--	--	--	--
JUN										
09...	1145	26	420	8.1	16.5	8.4	87	--	.41	--
JUL										
06...	1410	19	410	7.9	17.5	8.8	91	--	--	--
AUG										
03...	1515	22	400	7.9	18.0	8.7	91	.85	.42	.41
SEP										
14...	1445	19	420	8.0	17.0	8.8	91	--	--	--
OCT										
02...	1545	35	400	--	--	--	--	.69	.25	.26
27...	1445	24	420	8.1	10.0	9.8	87	.66	.51	.49
NOV										
16...	1400	21	410	8.1	8.0	9.7	82	--	.55	--
DEC										
07...	1431	22	385	8.1	6.5	10.9	89	.70	.55	.54
JAN , 1982										
18...	1500	19	420	7.3	2.5	12.5	90	--	.61	--
FEB										
16...	1315	22	385	8.0	5.5	--	--	--	.55	--
MAR										
08...	1645	22	400	8.0	4.5	12.0	91	.94	.60	.55
16...	1010	68	260	7.7	3.5	11.8	89	--	.37	--
APR										
19...	1315	32	400	8.2	12.0	11.2	104	--	.38	--
MAY										
11...	1400	24	410	8.4	17.0	9.6	99	--	.40	--
JUN										
14...	1445	24	410	8.3	17.0	9.1	89	.97	.39	.46
JUL										
21...	1040	38	395	8.0	19.0	7.7	82	--	--	--
AUG										
10...	1050	21	405	8.1	15.0	8.8	85	--	--	--

04102178 EAST BRANCH PAW PAW RIVER NEAR LAWTON, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NITRITE DISSOLVED (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)
APR , 1980									
23...	--	--	--	--	--	--	--	--	--
MAY									
08...	--	--	--	--	--	--	--	--	--
JUN									
02...	.010	--	.31	--	.030	--	.31	--	.34
JUL									
07...	.010	--	.36	--	.020	--	.24	--	.26
AUG									
04...	.010	--	.19	--	.000	--	.30	--	.30
SEP									
02...	.000	--	.20	--	.000	--	.28	--	.28
OCT									
14...	.000	--	.40	--	.030	--	.09	--	.12
DEC									
01...	.010	--	.45	--	.010	--	.18	--	.19
JAN , 1981									
06...	.020	.010	2.0	1.9	.190	.150	.52	.36	.71
FEB									
02...	.030	--	.60	--	.060	--	.22	--	.28
MAR									
02...	<.010	<.010	.52	.57	.080	.070	.28	.29	.36
APR									
06...	<.010	--	.47	--	.040	--	.15	--	.19
MAY									
11...	<.010	--	.16	--	.030	--	.50	--	.53
14...	--	--	--	--	--	--	--	--	--
JUN									
09...	<.010	--	.41	--	.050	--	.14	--	.19
JUL									
06...	<.010	--	<.01	--	<.010	--	.34	--	.34
AUG									
03...	<.010	<.010	.42	.41	.020	.020	.55	.42	.57
SEP									
14...	<.010	--	.44	--	.030	--	.23	--	.26
OCT									
02...	<.010	<.010	.25	.26	.040	.020	.40	.41	.44
27...	<.010	<.010	.51	.49	<.010	<.010	.19	.17	.19
NOV									
16...	<.010	--	.55	--	.020	--	.29	--	.31
DEC									
07...	<.010	<.010	.55	.54	.050	.040	.18	.12	.23
JAN , 1982									
18...	.010	--	.62	--	.040	--	.31	--	.35
FEB									
16...	.020	--	.57	--	.050	--	.32	--	.37
MAR									
08...	<.010	<.010	.60	.55	.060	.070	.47	.32	.53
16...	.010	--	.38	--	.080	--	.31	--	.39
APR									
19...	.010	--	.39	--	.040	--	.26	--	.30
MAY									
11...	.010	--	.41	--	.020	--	.68	--	.70
JUN									
14...	.010	.010	.40	.47	.010	<.010	.59	.50	.60
JUL									
21...	--	--	--	--	--	--	--	--	--
AUG									
10...	--	--	--	--	--	--	--	--	--

04102178 EAST BRANCH PAW PAW RIVER NEAR LAWTON, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN,NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITROGEN,AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
APR , 1980									
23...	--	--	--	--	--	--	--	6	.42
MAY									
08...	--	--	--	--	--	--	--	11	.68
JUN									
02...	--	--	.65	.020	--	.010	--	14	--
JUL									
07...	--	--	.62	.010	--	.010	--	10	.65
AUG									
04...	--	--	.49	.020	--	.000	--	8	.91
SEP									
02...	--	--	.48	.060	--	.000	--	9	1.2
OCT									
14...	--	--	.52	.010	--	.000	--	3	.18
DEC									
01...	--	--	.64	.010	--	.010	--	16	1.3
JAN , 1981									
06...	--	.51	2.7	.040	.020	.010	.010	8	.52
FEB									
02...	--	--	.88	.020	--	<.010	--	7	.42
MAR									
02...	.08	.36	.88	.010	<.010	<.010	<.010	9	.73
APR									
06...	--	--	.66	.020	--	<.010	--	8	.52
MAY									
11...	--	--	.69	.020	--	<.010	--	33	7.5
14...	--	--	--	--	--	--	--	10	--
JUN									
09...	--	--	.60	<.010	--	<.010	--	9	.63
JUL									
06...	--	--	--	.020	--	<.010	--	7	.36
AUG									
03...	--	.44	.99	<.010	<.010	.010	.020	7	.42
SEP									
14...	--	--	.70	.020	--	.010	--	5	.26
OCT									
02...	--	.43	.69	.020	.010	<.010	<.010	7	.66
27...	--	.17	.70	<.010	<.010	<.010	<.010	4	.26
NOV									
16...	--	--	.86	.030	--	.020	--	5	.28
DEC									
07...	--	.16	.78	.020	.010	.010	.050	3	.18
JAN , 1982									
18...	--	--	.97	--	--	<.010	--	7	.36
FEB									
16...	--	--	.94	<.010	--	<.010	--	2	.12
MAR									
08...	.14	.39	1.1	.010	<.010	<.010	<.010	6	.36
16...	--	--	.77	.030	--	<.010	--	27	5.0
APR									
19...	--	--	.69	.010	--	<.010	--	3	.26
MAY									
11...	--	--	1.1	.020	--	.010	--	7	.45
JUN									
14...	.10	.50	1.0	.020	.020	<.010	<.010	16	1.0
JUL									
21...	--	--	--	--	--	--	--	13	1.3
AUG									
10...	--	--	--	--	--	--	--	3	.17

04102178 EAST BRANCH PAW PAW RIVER NEAR LAWTON, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)
MAY , 1981												
11...	2000	1.7	28	150	8.0	37	14	3.5	.1	5	.8	140

DATE	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ARSENIC TOTAL (UG/L AS AS)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)
MAY , 1981												
11...	13	5.9	.1	8.1	.60	178	168	.24	40.4	1	1	<10

DATE	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)
MAY , 1981												
11...	1	5	440	4	<4	20	<.1	1	0	50	40	30

DATE	TIME	PCB, DISSOLVED (UG/L)	PCN DISSOLV (UG/L)	ALDRIN, DISSOLVED (UG/L)	AMETRYNE TOTAL	ATRATONE TOTAL (UG/L)	ATRAZINE, TOTAL (UG/L)	CHLORDANE, DISSOLVED (UG/L)	CYANAZINE TOTAL (UG/L)	CYPRAZINE TOTAL (UG/L)
MAY , 1981										
11...	2000	<.1	<.10	<.01	--	--	--	<.10	--	--
21...	1540	--	--	--	<.10	<.10	<.10	--	<.10	<.10

DATE	DDD, DISSOLVED (UG/L)	DDE, DISSOLVED (UG/L)	DDT, DISSOLVED (UG/L)	DIAZINON, DISSOLVED (UG/L)	DIELDRIN DISSOLVED (UG/L)	ENDOSULFAN DISSOLV (UG/L)	ENDRIN, DISSOLVED (UG/L)	ETHION DISSOLV (UG/L)	HEPTACHLOR, DISSOLVED (UG/L)	HEPTACHLOR EPOXIDE DISSOLVED (UG/L)
MAY , 1981										
11...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
21...	--	--	--	--	--	--	--	--	--	--

DATE	LINDANE DISSOLVED (UG/L)	MALATHION, DISSOLVED (UG/L)	METHOXYCHLOR DISSOLV (UG/L)	METHYL PARATHION, DISSOLVED (UG/L)	METHYLTRITHION DISSOLV (UG/L)	MIREX, DISSOLVED (UG/L)	PARATHION, DISSOLVED (UG/L)	PERTHANE DISSOLV (UG/L)	PROMETONE TOTAL (UG/L)	PROMETRYNE TOTAL (UG/L)
MAY , 1981										
11...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	--	--
21...	--	--	--	--	--	--	--	--	<.1	<.1

DATE	PROPAZINE TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	SIMAZINE TOTAL (UG/L)	SIMETONE TOTAL (UG/L)	SIMETRYNE TOTAL (UG/L)	TOXAPHENE, DISSOLVED (UG/L)	TRITHION DISSOLV (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
MAY , 1981										
11...	--	<.01	--	--	--	<1.0	<.01	.01	<.01	<.01
21...	<.10	--	<.10	<.10	<.1	--	--	--	--	--

04102180 EAST BRANCH PAW PAW RIVER AT PAW PAW, MI

LOCATION.--Lat 42°12'45", long 85°53'15", in NW¼ sec.13, T.3 S., R.14 W., Van Buren County, Hydrologic Unit 04050001, at bridge on M-40 at Paw Paw.

DRAINAGE AREA.--31.5 mi² (81.6 km²).

PERIOD OF RECORD.--April 1980 to August 1982 (discontinued).

REMARKS.--Water-quality and sediment samples were collected once a month and during high flow for analysis. Discharge measurements were made at time of sampling. All data for period of record is published in this report.

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
APR , 1980										
24...	0630	36	396	--	10.0	--	--	--	--	--
MAY										
08...	1130	36	378	--	12.0	--	--	--	--	--
JUN										
02...	1740	44	383	--	18.0	--	--	--	.29	--
JUL										
07...	1630	35	379	8.3	19.5	8.8	98	--	.31	--
AUG										
05...	0735	54	368	8.0	19.0	8.6	95	--	.19	--
SEP										
02...	1445	61	358	8.0	19.5	8.9	95	--	.17	--
OCT										
14...	1445	30	403	--	9.0	--	--	--	.39	--
DEC										
01...	1445	39	401	6.9	6.0	12.6	100	--	.44	--
JAN , 1981										
06...	1100	32	438	7.7	1.0	13.4	93	.75	.55	.55
FEB										
03...	0930	24	380	7.9	.0	13.8	96	--	.54	--
18...	1500	--	303	7.9	3.5	12.9	96	--	.51	--
MAR										
03...	0900	41	365	7.8	4.0	12.6	95	.86	.48	.56
APR										
07...	0830	34	380	8.0	7.5	11.8	96	--	.48	--
MAY										
12...	0830	114	290	7.7	7.0	11.6	94	--	.16	--
14...	1505	--	--	--	--	--	--	--	--	--
JUN										
09...	1300	36	380	8.1	18.0	9.0	96	--	.37	--
JUL										
06...	1530	29	400	8.1	19.0	9.0	96	--	<.01	--
AUG										
04...	0830	30	380	8.0	17.0	9.4	96	.56	--	.36
SEP										
14...	1600	27	400	8.2	18.5	8.8	94	--	.40	--
OCT										
02...	1656	64	360	--	--	--	--	.80	.21	.20
27...	0830	33	390	8.0	9.5	10.3	90	.65	.50	.50
NOV										
16...	1515	30	390	8.3	8.5	9.5	81	--	.50	--
DEC										
08...	0900	34	355	8.3	5.0	--	--	.59	.49	.49
JAN , 1982										
18...	1630	36	320	6.8	.5	13.1	90	--	.53	--
FEB										
16...	1415	32	380	8.0	5.5	--	--	--	.54	--
MAR										
09...	0845	30	380	8.7	1.5	13.2	92	.77	.55	.54
16...	1115	98	260	7.6	3.5	12.2	92	--	.48	--
APR										
19...	1415	46	380	8.3	14.0	11.3	109	--	.33	--
MAY										
11...	1500	37	395	8.6	20.0	9.7	105	--	.35	--
JUN										
14...	1530	34	390	8.4	18.0	9.5	93	.80	.40	.40
JUL										
21...	1200	55	380	8.0	20.0	8.6	93	--	.21	--
AUG										
10...	1200	30	385	8.2	16.5	9.4	95	--	--	--
17...	1045	28	340	8.2	16.0	8.8	87	--	--	--

04102180 EAST BRANCH PAW PAW RIVER AT PAW PAW, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
MAY									
08...	--	--	--	--	--	--	--	--	--
JUN									
02...	.010	--	.30	--	.010	--	.49	--	.50
JUL									
07...	.010	--	.32	--	.020	--	.23	--	.25
AUG									
05...	.010	--	.20	--	.020	--	.43	--	.45
SEP									
02...	.000	--	.17	--	.000	--	.32	--	.32
OCT									
14...	.000	--	.39	--	.020	--	.24	--	.26
DEC									
01...	.010	--	.45	--	.000	--	.21	--	.21
JAN , 1981									
06...	.020	.010	.57	.56	.070	.070	.18	.12	.25
FEB									
03...	<.010	--	.54	--	.050	--	.19	--	.24
18...	.010	--	.52	--	.090	--	.43	--	.52
MAR									
03...	<.010	<.010	.48	.56	.040	.050	.35	.25	.39
APR									
07...	<.010	--	.48	--	.040	--	.37	--	.41
MAY									
12...	<.010	--	.16	--	.030	--	.77	--	.80
14...	--	--	--	--	--	--	--	--	--
JUN									
09...	.010	--	.38	--	.050	--	.13	--	.18
JUL									
06...	<.010	--	<.01	--	<.010	--	.44	--	.44
AUG									
04...	--	<.010	--	.36	--	.010	--	.19	--
SEP									
14...	.010	--	.41	--	.040	--	.22	--	.26
OCT									
02...	<.010	<.010	.21	.20	.030	.010	.64	.59	.67
27...	<.010	<.010	.50	.50	<.010	.010	.33	.14	.33
NOV									
16...	<.010	--	.50	--	.010	--	.22	--	.23
DEC									
08...	<.010	<.010	.49	.49	.020	.030	.11	.07	.13
JAN , 1982									
18...	.020	--	.55	--	.050	--	.39	--	.44
FEB									
16...	.020	--	.56	--	.080	--	--	--	<.10
MAR									
09...	<.010	<.010	.55	.54	.040	.040	.20	.19	.24
16...	<.010	--	.48	--	.040	--	.29	--	.33
APR									
19...	<.010	--	.33	--	.060	--	.25	--	.31
MAY									
11...	.010	--	.36	--	.020	--	.65	--	.67
JUN									
14...	<.010	<.010	.40	.40	<.010	<.010	.20	--	.20
JUL									
21...	.010	--	.22	--	.050	--	.45	--	.50
AUG									
10...	--	--	--	--	--	--	--	--	--
17...	--	--	--	--	--	--	--	--	--

04102180 EAST BRANCH PAW PAW RIVER AT PAW PAW, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN, NH4 + ORG, SUSP, TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
APR , 1980									
24...	--	--	--	--	--	--	--	12	1.2
MAY									
08...	--	--	--	--	--	--	--	10	.97
JUN									
02...	--	--	.80	.020	--	.000	--	13	--
JUL									
07...	--	--	.57	.020	--	.010	--	8	.76
AUG									
05...	--	--	.65	.030	--	.010	--	8	1.2
SEP									
02...	--	--	.49	.030	--	.000	--	9	1.5
OCT									
14...	--	--	.65	.040	--	.000	--	6	.49
DEC									
01...	--	--	.66	.020	--	.010	--	13	1.4
JAN , 1981									
06...	--	.19	.82	.020	.000	.010	.010	8	.69
FEB									
03...	--	--	.78	.050	--	<.010	--	14	.91
18...	--	--	1.0	.030	--	<.010	--	24	--
MAR									
03...	.09	.30	.87	.010	<.010	.010	<.010	12	1.3
APR									
07...	--	--	.89	.020	--	.010	--	16	1.5
MAY									
12...	--	--	.96	.020	--	<.010	--	13	4.0
14...	--	--	--	--	--	--	--	12	--
JUN									
09...	--	--	.56	<.010	--	<.010	--	15	1.5
JUL									
06...	--	--	--	.020	--	<.010	--	11	.86
AUG									
04...	--	.20	--	--	.020	--	<.010	17	1.4
SEP									
14...	--	--	.67	.020	--	.020	--	5	.36
OCT									
02...	--	.60	.88	<.010	<.010	.020	<.010	17	2.9
27...	--	.15	.83	.010	<.010	<.010	<.010	14	1.2
NOV									
16...	--	--	.73	.020	--	.030	--	9	.73
DEC									
08...	--	.10	.62	.020	<.010	<.010	<.010	13	1.2
JAN , 1982									
18...	--	--	.99	--	--	<.010	--	88	8.6
FEB									
16...	--	--	--	.010	--	<.010	--	4	.35
MAR									
09...	.01	.23	.79	<.010	<.010	<.010	<.010	5	.40
16...	--	--	.81	.030	--	.010	--	8	2.1
APR									
19...	--	--	.64	.020	--	<.010	--	6	.75
MAY									
11...	--	--	1.0	.020	--	<.010	--	6	.60
JUN									
14...	.00	.40	.60	.020	.010	<.010	<.010	--	--
JUL									
21...	--	--	.72	.020	--	<.010	--	7	1.0
AUG									
10...	--	--	--	--	--	--	--	6	.49
17...	--	--	--	--	--	--	--	--	--

04102180 EAST BRANCH PAW PAW RIVER AT PAW PAW, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)
MAY , 1981											
12...	0830	1.5	30	140	3.0	36	13	4.3	.2	6	.7
AUG , 1982											
17...	1045	1.4	16	200	20	48	19	6.8	.2	7	.5

DATE	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)
MAY , 1981											
12...	140	13	6.4	.1	8.3	.50	175	167	.24	53.9	--
AUG , 1982											
17...	178	22	9.9	.1	10	--	257	223	.35	19.4	50

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BORON, TOTAL RECOVERABLE (UG/L AS B)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)
MAY , 1981											
12...	1	--	--	1	10	2	7	300	--	4	<4
AUG , 1982											
17...	3	100	20	--	20	2	5	190	11	2	--

DATE	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
MAY , 1981										
12...	20	--	<.1	9	0	50	50	20	--	--
AUG , 1982										
17...	20	13	--	3	--	80	--	20	<.01	<1

WATER-QUALITY DATA

DATE	TIME	PCB, DIS-SOLVED (UG/L)	PCN DISSOLV (UG/L)	ALDRIN, DIS-SOLVED (UG/L)	CHLOR-DANE, DIS-SOLVED (UG/L)	DDD, DIS-SOLVED (UG/L)	DDE, DIS-SOLVED (UG/L)	DDT, DIS-SOLVED (UG/L)	DI-AZINON, DIS-SOLVED (UG/L)	DI-ELDRIN DIS-SOLVED (UG/L)	ENDO-SULFAN DISSOLV (UG/L)
MAY , 1981											
12...	0800	<.1	<.10	<.01	<.10	<.01	<.01	<.01	<.01	<.01	<.01
AUG , 1982											
17...	1045	--	--	--	--	--	--	--	--	--	--

DATE	ENDRIN, DIS-SOLVED (UG/L)	ETHION DISSOLV (UG/L)	HEPTA-CHLOR, DIS-SOLVED (UG/L)	HEPTA-CHLOR EPOXIDE DIS-SOLVED (UG/L)	LINDANE DIS-SOLVED (UG/L)	MALA-THION, DIS-SOLVED (UG/L)	METHO-MYL TOTAL (UG/L)	METH-OXY-CHLOR DISSOLV (UG/L)	METHYL PARA-THION, DIS-SOLVED (UG/L)	METHYL-TRI-THION DISSOLV (UG/L)	MIREX, DIS-SOLVED (UG/L)
MAY , 1981											
12...	<.01	<.01	<.01	<.01	<.01	<.01	.0	<.01	<.01	<.01	<.01
AUG , 1982											
17...	--	--	--	--	--	--	--	--	--	--	--

DATE	PARA-THION, DIS-SOLVED (UG/L)	PER-THANE DISSOLV (UG/L)	PROPHAM TOTAL (UG/L)	SEVIN, TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	TOX-APHENE, DIS-SOLVED (UG/L)	TRI-THION DISSOLV (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
MAY , 1981										
12...	<.01	<.01	.0	.00	<.01	<1.0	<.01	<.01	<.01	<.01
AUG , 1982										
17...	--	--	--	--	<.01	--	--	<.01	<.01	<.01

04102192 SOUTH BRANCH PAW PAW RIVER AT PAW PAW, MI

LOCATION.--Lat 42°14'06", long 85°53'10", in SE¼ sec.1, T.3 S., R.14 W., Van Buren County, Hydrologic Unit 04050001, above dam at 51st Ave., 1 mi (1.6 km) north of Paw Paw.

DRAINAGE AREA.--94.3 mi² (244.2 km²).

PERIOD OF RECORD.--April 1980 to August 1982 (discontinued).

REMARKS.--Water-quality and sediment samples were collected once a month and during high flow for analysis. Discharge measurements were made at time of sampling. All data for period of record is published in this report.

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
APR , 1980										
24...	1710	113	485	--	13.5	--	--	--	--	--
MAY										
08...	1310	95	480	--	15.0	--	--	--	--	--
JUN										
03...	0730	193	478	--	18.0	--	--	--	.27	--
JUL										
08...	1100	118	474	7.9	20.5	9.7	117	--	.62	--
AUG										
05...	0900	133	424	7.9	20.0	8.6	102	--	.44	--
SEP										
02...	1715	179	446	8.2	21.0	7.4	84	--	.42	--
OCT										
15...	1130	97	500	--	10.0	--	--	--	.43	--
DEC										
02...	0800	159	502	7.2	4.0	11.7	89	--	.81	--
JAN , 1981										
07...	0930	114	542	7.7	.0	13.2	89	1.4	.94	.94
FEB										
03...	1030	112	460	7.8	1.5	12.2	85	--	.93	--
MAR										
03...	0955	144	450	7.7	4.5	12.4	95	1.4	.95	1.10
APR										
07...	0930	110	375	8.0	11.5	11.5	93	--	.61	--
MAY										
13...	1945	182	400	7.9	11.5	9.8	88	--	.88	--
14...	1520	--	--	--	--	--	--	--	--	--
JUN										
09...	1445	118	480	8.2	22.0	8.4	95	--	.52	--
JUL										
06...	1730	81	450	8.4	26.0	11.0	132	--	--	--
AUG										
04...	1030	74	430	8.5	24.0	11.8	139	.56	.27	.27
SEP										
15...	0845	74	440	8.5	20.0	11.0	120	--	.29	--
OCT										
27...	1615	90	520	8.0	9.0	10.9	93	1.2	.82	.85
NOV										
17...	0930	30	480	8.2	7.5	10.5	87	--	.84	--
DEC										
08...	1100	96	435	8.0	4.0	--	--	1.3	.96	.98
JAN , 1982										
19...	1145	92	520	7.8	.0	12.4	84	--	.97	--
FEB										
16...	1530	96	480	7.8	2.5	--	--	--	.97	--
MAR										
09...	0945	86	490	7.9	1.5	12.0	84	1.4	.98	.96
APR										
19...	1445	161	480	8.4	14.0	11.8	113	--	.87	--
MAY										
11...	1530	113	470	8.8	21.0	7.8	87	--	.46	--
JUN										
15...	0900	92	460	8.5	20.5	10.0	111	.99	.58	.57
JUL										
21...	1345	208	420	8.0	25.0	7.3	87	--	.36	--
AUG										
10...	1340	67	420	8.5	23.0	12.2	139	--	--	--
17...	1300	64	395	8.5	23.0	16.0	182	--	--	--

04102192 SOUTH BRANCH PAW PAW RIVER AT PAW PAW, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NITRITE DISSOLVED (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
MAY									
08...	--	--	--	--	--	--	--	--	--
JUN									
03...	.020	--	.29	--	.080	--	.83	--	.91
JUL									
08...	.030	--	.65	--	.080	--	.53	--	.61
AUG									
05...	.030	--	.47	--	.030	--	.64	--	.67
SEP									
02...	.020	--	.44	--	.110	--	.39	--	.50
OCT									
15...	.020	--	.45	--	.020	--	.41	--	.43
DEC									
02...	.010	--	.82	--	.000	--	.22	--	.22
JAN , 1981									
07...	.030	.020	.96	.96	.150	.150	.27	.27	.42
FEB									
03...	.010	--	.95	--	.110	--	.17	--	.28
MAR									
03...	.010	.010	.96	1.1	.110	.120	.36	.15	.47
APR									
07...	.010	--	.62	--	.020	--	.51	--	.53
MAY									
13...	.020	--	.90	--	.060	--	.67	--	.73
14...	--	--	--	--	--	--	--	--	--
JUN									
09...	<.010	--	.52	--	.050	--	.28	--	.33
JUL									
06...	<.010	--	.01	--	.040	--	.56	--	.60
AUG									
04...	.020	.020	.29	.29	.010	.010	.65	.26	.66
SEP									
15...	.030	--	.32	--	.030	--	.60	--	.63
OCT									
27...	.020	.020	.84	.87	.070	.060	.44	.28	.51
NOV									
17...	.010	--	.85	--	.080	--	.27	--	.35
DEC									
08...	.010	.010	.97	.99	.090	.100	.27	.20	.36
JAN , 1982									
19...	.020	--	.99	--	.140	--	.40	--	.54
FEB									
16...	.030	--	1.0	--	.140	--	.59	--	.73
MAR									
09...	.010	<.010	.99	.96	.110	.110	.23	.30	.34
APR									
19...	.020	--	.89	--	.050	--	.58	--	.63
MAY									
11...	.020	--	.48	--	.010	--	4.4	--	4.40
JUN									
15...	.020	.020	.60	.59	<.010	<.010		.40	
JUL									
21...	.030	--	.39	--	.040	--	.46	--	.50
AUG									
10...	--	--	--	--	--	--	--	--	--
17...	--	--	--	--	--	--	--	--	--

04102192 SOUTH BRANCH PAW PAW RIVER AT PAW PAW, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
APR , 1980									
24...	--	--	--	--	--	--	--	12	3.7
MAY									
08...	--	--	--	--	--	--	--	20	5.1
JUN									
03...	--	--	1.2	.080	--	.030	--	11	--
JUL									
08...	--	--	1.3	.050	--	.000	--	8	2.5
AUG									
05...	--	--	1.1	.030	--	.000	--	8	2.9
SEP									
02...	--	--	.94	.040	--	.000	--	5	2.4
OCT									
15...	--	--	.88	.050	--	.000	--	4	2.1
DEC									
02...	--	--	1.0	.020	--	.000	--	16	6.9
JAN , 1981									
07...	--	.42	1.4	.010	.000	.020	.020	11	3.4
FEB									
03...	--	--	1.2	.030	--	<.010	--	20	6.0
MAR									
03...	.20	.27	1.4	.020	<.010	<.010	<.010	5	1.9
APR									
07...	--	--	1.2	.040	--	<.010	--	8	2.4
MAY									
13...	--	--	1.6	.040	--	<.010	--	6	2.9
14...	--	--	--	--	--	--	--	7	--
JUN									
09...	--	--	.85	.010	--	<.010	--	6	1.9
JUL									
06...	--	--	.61	.020	--	.020	--	16	3.5
AUG									
04...	.39	.27	.95	.020	.020	<.010	<.010	4	.80
SEP									
15...	--	--	.95	.030	--	<.010	--	10	2.0
OCT									
27...	--	.34	1.4	.030	<.010	.020	<.010	4	.97
NOV									
17...	--	--	1.2	.030	--	<.010	--	7	.57
DEC									
08...	--	.30	1.3	.020	<.010	<.010	<.010	11	2.9
JAN , 1982									
19...	--	--	1.5	.020	--	.010	--	2	.50
FEB									
16...	--	--	1.7	<.010	--	<.010	--	0	.00
MAR									
09...	.00	.41	1.3	.010	.010	<.010	.010	3	.70
APR									
19...	--	--	1.5	.040	--	.020	--	6	2.6
MAY									
11...	--	--	4.9	.020	--	<.010	--	6	1.8
JUN									
15...	.00	.40		<.010	.030	<.010	.010	1	.25
JUL									
21...	--	--	.89	.020	--	<.010	--	5	2.8
AUG									
10...	--	--	--	--	--	--	--	6	1.1
17...	--	--	--	--	--	--	--	8	1.4

04102192 SOUTH BRANCH PAW PAW RIVER AT PAW PAW, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)
MAY , 1981											
13...	1945	3.7	31	200	32	53	17	7.4	.2	7	1.4
AUG , 1982											
17...	1300	3.7	16	210	35	50	21	12	.4	11	1.1

DATE	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)
MAY , 1981											
13...	170	42	13	.1	7.8	1.0	310	244	.42	152	--
AUG , 1982											
17...	176	39	18	.2	6.0	--	292	253	.40	50.5	50

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BORON, TOTAL RECOVERABLE (UG/L AS B)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)
MAY , 1981											
13...	1	--	--	1	<10	1	9	500	--	8	<4
AUG , 1982											
17...	3	<100	40	--	20	1	5	180	9	2	--

DATE	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
MAY , 1981										
13...	50	--	<.1	7	0	90	80	40	--	--
AUG , 1982										
17...	40	2	--	3	--	100	--	70	<.01	<1

04102192 SOUTH BRANCH PAW PAW RIVER AT PAW PAW, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	PCB, DIS-SOLVED (UG/L)	PCN DISSOLV (UG/L)	ALDRIN, DIS-SOLVED (UG/L)	CHLOR-DANE, DIS-SOLVED (UG/L)	DDD, DIS-SOLVED (UG/L)	DDE, DIS-SOLVED (UG/L)	DDT, DIS-SOLVED (UG/L)	DI-AZINON, DIS-SOLVED (UG/L)	DI-ELDRIN DIS-SOLVED (UG/L)	ENDO-SULFAN DISSOLV (UG/L)
MAY , 1981											
13...	1945	<.1	<.10	<.01	<.10	<.01	<.01	<.01	<.01	<.01	<.01
AUG , 1982											
17...	1300	--	--	--	--	--	--	--	--	--	--

DATE	ENDRIN, DIS-SOLVED (UG/L)	ETHION DISSOLV (UG/L)	HEPTA-CHLOR, DIS-SOLVED (UG/L)	HEPTA-CHLOR EPOXIDE DIS-SOLVED (UG/L)	LINDANE DIS-SOLVED (UG/L)	MALA-THION, DIS-SOLVED (UG/L)	METHO-MYL TOTAL (UG/L)	METH-OXY-CHLOR DISSOLV (UG/L)	METHYL PARA-THION, DIS-SOLVED (UG/L)	METHYL-TRI-THION DISSOLV (UG/L)	MIREX, DIS-SOLVED (UG/L)
MAY , 1981											
13...	<.01	<.01	<.01	<.01	<.01	<.01	.0	<.01	<.01	<.01	<.01
AUG , 1982											
17...	--	--	--	--	--	--	--	--	--	--	--

DATE	PARA-THION, DIS-SOLVED (UG/L)	PER-THANE DISSOLV (UG/L)	PROPHAM TOTAL (UG/L)	SEVIN, TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	TOX-APHENE, DIS-SOLVED (UG/L)	TRI-THION DISSOLV (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
MAY , 1981										
13...	<.01	<.01	.0	.00	<.01	<1.0	<.01	<.01	<.01	<.01
AUG , 1982										
17...	--	--	--	--	<.01	--	--	<.01	<.01	<.01

04102212 NORTH BRANCH PAW PAW RIVER NEAR PAW PAW, MI

LOCATION.--Lat 42°16'39", long 85°51'48", in SW¼ sec.20, T.2 S., R.13 W., Van Buren County, Hydrologic Unit 04050001, at bridge on 32nd St., 4.3 mi (6.9 km) northeast of Paw Paw.

DRAINAGE AREA.--37.8 mi² (97.9 km²).

PERIOD OF RECORD.--April 1980 to August 1982 (discontinued).

REMARKS.--Water-quality and sediment samples were collected once a month and during high flow for analysis. Discharge measurements were made at time of sampling. All data for period of record is published in this report.

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
APR , 1980										
24...	1600	55	487	--	9.5	--	--	--	--	--
MAY										
08...	1440	47	417	--	12.0	--	--	--	--	--
JUN										
03...	1050	185	319	--	17.0	--	--	--	.29	--
JUL										
08...	1300	53	429	7.8	21.5	7.3	84	--	.35	--
AUG										
05...	1135	92	412	7.8	20.0	6.4	72	--	.22	--
SEP										
03...	0900	85	384	8.0	17.0	6.6	67	--	.22	--
OCT										
14...	1600	49	425	--	9.0	--	--	--	.45	--
DEC										
02...	1030	89	385	6.8	4.0	10.5	79	--	.39	--
JAN , 1981										
07...	1300	60	446	7.2	.0	10.8	72	.79	.60	.60
FEB										
03...	1145	38	360	7.7	.0	11.7	81	--	.63	--
18...	1730	225	276	7.5	2.0	11.9	85	--	.95	--
MAR										
03...	1030	67	395	7.7	2.5	12.6	90	1.1	.61	.75
APR										
07...	1015	51	400	7.8	8.5	10.5	85	--	.55	--
MAY										
12...	1300	224	285	7.6	9.5	10.4	89	--	.47	--
14...	1535	--	--	--	--	--	--	--	--	--
JUN										
09...	1600	51	400	7.8	19.5	7.5	81	--	--	--
JUL										
07...	1100	45	400	7.9	21.0	7.3	79	--	.28	--
AUG										
04...	1245	51	370	8.0	21.0	7.9	87	.56	.33	.32
SEP										
15...	1045	37	390	8.1	16.5	8.8	89	--	.46	--
OCT										
28...	1000	58	420	7.8	8.0	9.6	79	.95	.42	.43
NOV										
17...	1100	49	405	8.1	8.0	10.5	88	--	.51	--
DEC										
08...	1300	59	390	8.0	4.5	--	--	.81	.52	.53
JAN , 1982										
19...	1435	59	400	7.4	.0	8.4	57	--	.60	--
FEB										
17...	0900	65	395	7.6	2.0	--	--	--	.55	--
MAR										
09...	1045	51	405	7.9	.5	12.4	86	1.1	.63	.60
16...	1245	253	255	7.6	5.0	11.6	88	--	.99	--
APR										
20...	0945	72	395	8.1	12.0	9.1	84	--	.46	--
MAY										
12...	1100	47	395	8.2	19.0	7.3	78	--	.42	--
JUN										
15...	1000	47	395	8.1	19.0	7.2	80	1.1	.58	.57
JUL										
21...	1515	121	400	7.7	22.0	5.6	64	--	1.7	--
AUG										
10...	1500	53	380	8.0	19.5	8.2	87	--	--	--
17...	1500	40	360	8.2	21.0	8.5	93	--	--	--

04102212 NORTH BRANCH PAW PAW RIVER NEAR PAW PAW, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
MAY									
08...	--	--	--	--	--	--	--	--	--
JUN									
03...	.010	--	.30	--	.050	--	.64	--	.69
JUL									
08...	.010	--	.36	--	.020	--	.29	--	.31
AUG									
05...	.010	--	.23	--	.010	--	.34	--	.35
SEP									
03...	.010	--	.23	--	.010	--	.21	--	.22
OCT									
14...	.010	--	.46	--	.020	--	.22	--	.24
DEC									
02...	.010	--	.40	--	.000	--	.23	--	.23
JAN , 1981									
07...	.010	.010	.61	.61	.090	.080	.16	.10	.25
FEB									
03...	<.010	--	.63	--	.090	--	.06	--	.15
18...	.010	--	.96	--	.050	--	.35	--	.40
MAR									
03...	<.010	<.010	.61	.75	.060	.040	.32	.26	.38
APR									
07...	<.010	--	.55	--	.050	--	.47	--	.52
MAY									
12...	.010	--	.48	--	.030	--	.70	--	.73
14...	--	--	--	--	--	--	--	--	--
JUN									
09...	--	--	--	--	--	--	--	--	1.50
JUL									
07...	<.010	--	.28	--	.020	--	.48	--	.50
AUG									
04...	<.010	<.010	.33	.32	.010	.020	.64	.22	.65
SEP									
15...	<.010	--	.46	--	.030	--	.60	--	.63
OCT									
28...	<.010	.010	.42	.44	.030	.020	.69	.49	.72
NOV									
17...	<.010	--	.51	--	.020	--	6.2	--	6.20
DEC									
08...	<.010	<.010	.52	.53	.030	.030	.20	.25	.23
JAN , 1982									
19...	.030	--	.63	--	.090	--	.31	--	.40
FEB									
17...	<.010	--	.55	--	.260	--	9.1	--	9.40
MAR									
09...	<.010	<.010	.63	.60	.070	.050	.15	.49	.22
16...	.010	--	1.0	--	.030	--	.64	--	.67
APR									
20...	<.010	--	.46	--	.050	--	.61	--	.66
MAY									
12...	.020	--	.44	--	.050	--	1.5	--	1.50
JUN									
15...	.020	.020	.60	.59	.030	.020	.47	.48	.50
JUL									
21...	.050	--	1.7	--	.070	--	.73	--	.80
AUG									
10...	--	--	--	--	--	--	--	--	--
17...	--	--	--	--	--	--	--	--	--

04102212 NORTH BRANCH PAW PAW RIVER NEAR PAW PAW, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN,NH4 + ORG, SUSP, TOTAL (MG/L AS N)	NITROGEN,AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
APR , 1980									
24...	--	--	--	--	--	--	--	10	1.5
MAY									
08...	--	--	--	--	--	--	--	8	1.0
JUN									
03...	--	--	.99	.050	--	.010	--	16	4.5
JUL									
08...	--	--	.67	.040	--	.010	--	9	1.3
AUG									
05...	--	--	.58	.020	--	.000	--	5	1.2
SEP									
03...	--	--	.45	.050	--	.020	--	7	1.6
OCT									
14...	--	--	.70	.040	--	.010	--	5	.66
DEC									
02...	--	--	.63	.030	--	.010	--	6	1.4
JAN , 1981									
07...	--	.18	.86	.020	.020	.020	.020	8	1.3
FEB									
03...	--	--	.78	.070	--	<.010	--	5	.51
18...	--	--	1.4	.040	--	.010	--	8	4.9
MAR									
03...	--	.30	.99	.010	<.010	<.010	<.010	5	.90
APR									
07...	--	--	1.1	.030	--	.010	--	9	1.2
MAY									
12...	--	--	1.2	.040	--	<.010	--	4	2.4
14...	--	--	--	--	--	--	--	5	--
JUN									
09...	--	--	--	--	--	--	--	18	2.5
JUL									
07...	--	--	.78	.040	--	<.010	--	18	2.2
AUG									
04...	.41	.24	.98	.050	.020	.020	<.010	14	1.9
SEP									
15...	--	--	1.1	.020	--	.080	--	11	1.1
OCT									
28...	--	.51	1.1	.020	<.010	<.010	<.010	3	.47
NOV									
17...	--	--	4.7	.030	--	<.010	--	3	.40
DEC									
08...	--	.28	.75	.020	<.010	<.010	<.010	4	.64
JAN , 1982									
19...	--	--	1.0	.020	--	<.010	--	1	.16
FEB									
17...	--	--	10	.020	--	.010	--	6	1.1
MAR									
09...	.08	.44	.85	.020	<.010	<.010	<.010	8	1.1
16...	--	--	1.7	.040	--	.010	--	3	2.0
APR									
20...	--	--	1.1	.020	--	<.010	--	2	.39
MAY									
12...	--	--	1.9	.040	--	.020	--	9	1.1
JUN									
15...	.00	.50	1.1	.050	.020	.020	<.010	18	2.3
JUL									
21...	--	--	2.5	.050	--	.020	--	2	.65
AUG									
10...	--	--	--	--	--	--	--	8	1.1
17...	--	--	--	--	--	--	--	--	--

04102212 NORTH BRANCH PAW PAW RIVER NEAR PAW PAW, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)
MAY , 1981											
12...	1300	1.9	55	150	7.0	39	12	3.9	.1	5	1.1
AUG , 1982											
17...	1500	1.6	16	210	15	53	18	5.4	.2	5	.4

DATE	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)
MAY , 1981											
12...	140	21	5.9	.1	7.3	.80	186	175	.25	112	--
AUG , 1982											
17...	191	23	8.1	.2	9.7	--	246	233	.33	26.6	80

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BORON, TOTAL RECOVERABLE (UG/L AS B)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)
MAY , 1981											
12...	1	--	--	1	<10	1	6	900	--	4	4
AUG , 1982											
17...	3	200	20	--	20	1	5	270	8	4	--

DATE	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
MAY , 1981										
12...	20	--	<.1	3	0	80	70	50	--	--
AUG , 1982										
17...	40	15	--	1	--	90	--	10	<.01	<1

STREAMS TRIBUTARY TO LAKE MICHIGAN

04102212 NORTH BRANCH PAW PAW RIVER NEAR PAW PAW, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	PCB, DIS-SOLVED (UG/L)	PCN DISSOLV (UG/L)	ALDRIN, DIS-SOLVED (UG/L)	CHLOR-DANE, DIS-SOLVED (UG/L)	DDD, DIS-SOLVED (UG/L)	DDE, DIS-SOLVED (UG/L)	DDT, DIS-SOLVED (UG/L)	DI-AZINON, DIS-SOLVED (UG/L)	DI-ELDRIN DIS-SOLVED (UG/L)	ENDO-SULFAN DISSOLV (UG/L)
MAY , 1981											
12...	1300	<.1	<.10	<.01	<.10	<.01	<.01	<.01	<.01	<.01	<.01
AUG , 1982											
17...	1500	--	--	--	--	--	--	--	--	--	--

DATE	ENDRIN, DIS-SOLVED (UG/L)	ETHION DISSOLV (UG/L)	HEPTA-CHLOR, DIS-SOLVED (UG/L)	HEPTA-CHLOR EPOXIDE DIS-SOLVED (UG/L)	LINDANE DIS-SOLVED (UG/L)	MALA-THION, DIS-SOLVED (UG/L)	METHO-MYL TOTAL (UG/L)	METH-OXY-CHLOR DISSOLV (UG/L)	METHYL PARA-THION, DIS-SOLVED (UG/L)	METHYL-TRI-THION DISSOLV (UG/L)	MIREX, DIS-SOLVED (UG/L)
MAY , 1981											
12...	<.01	<.01	<.01	<.01	<.01	<.01	.0	<.01	<.01	<.01	<.01
AUG , 1982											
17...	--	--	--	--	--	--	--	--	--	--	--

DATE	PARA-THION, DIS-SOLVED (UG/L)	PER-THANE DISSOLV (UG/L)	PROPHAM TOTAL (UG/L)	SEVIN, TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	TOX-APHENE, DIS-SOLVED (UG/L)	TRI-THION DISSOLV (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
MAY , 1981										
12...	<.01	<.01	.0	.00	<.01	<1.0	<.01	<.01	<.01	<.01
AUG , 1982										
17...	--	--	--	--	<.01	--	--	.02	<.01	<.01

04102217 UNNAMED TRIBUTARY TO NORTH BRANCH PAW PAW RIVER NEAR PAW PAW, MI

LOCATION.--Lat 42°15'58", long 85°51'49", in SW¼ sec.29, T.2 S., R.13 W., Van Buren County, Hydrologic Unit 04050001, at bridge on 32nd St., 3.5 mi (5.6 km) northeast of Paw Paw.

DRAINAGE AREA.--17.6 mi² (45.6 km²).

PERIOD OF RECORD.--April 1980 to August 1982 (discontinued).

REMARKS.--Water-quality and sediment samples were collected once a month and during high flow for analysis. Discharge measurements were made at time of sampling. All data for period of record is published in this report.

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
APR , 1980										
24...	1450	16	341	--	10.5	--	--	--	--	--
MAY										
08...	1530	13	358	--	14.0	--	--	--	--	--
JUN										
03...	1220	25	317	--	19.5	--	--	--	.70	--
JUL										
08...	1415	13	344	8.1	25.0	9.6	116	--	.88	--
AUG										
05...	1245	16	340	8.0	21.0	7.5	85	--	.67	--
SEP										
03...	1040	15	347	7.8	18.0	9.2	95	--	.79	--
OCT										
14...	1700	13	376	--	10.0	--	--	--	.94	--
DEC										
02...	1200	20	344	7.2	4.0	11.4	86	--	.98	--
JAN , 1981										
07...	1500	12	404	7.2	1.5	12.6	86	1.5	--	1.30
FEB										
03...	1305	14	350	7.5	.0	11.3	78	--	1.4	--
MAR										
03...	1130	14	340	7.7	4.5	12.2	92	1.4	.95	1.20
APR										
07...	1110	13	350	8.0	11.5	11.2	91	--	1.1	--
MAY										
12...	1100	33	290	7.8	10.5	11.0	96	--	.49	--
14...	1530	--	--	--	--	--	--	--	--	--
JUN										
10...	0830	15	360	7.9	17.0	8.7	91	--	.83	--
JUL										
07...	1240	12	350	8.3	23.5	9.2	105	--	.59	--
AUG										
04...	1500	12	345	8.2	24.0	8.0	93	1.1	.70	.69
SEP										
15...	1215	10	360	8.1	18.0	9.4	98	--	.82	--
OCT										
28...	1145	11	370	7.9	10.0	11.1	97	1.5	.99	.99
NOV										
17...	1215	12	365	8.2	9.5	11.3	98	--	1.1	--
DEC										
08...	1430	13	340	8.0	4.5	--	--	1.2	1.1	1.10
JAN , 1982										
19...	1530	12	380	7.6	.0	12.6	85	--	1.3	--
FEB										
17...	1015	13	370	7.6	3.0	--	--	--	1.2	--
MAR										
09...	1200	11	340	7.9	4.0	12.4	93	1.5	1.3	1.30
16...	1415	36	255	7.5	4.5	11.8	92	--	.72	--
APR										
20...	1100	18	325	8.2	13.5	11.5	110	--	.99	--
MAY										
12...	1215	15	360	8.4	20.0	9.9	108	--	.96	--
JUN										
15...	1100	14	340	8.0	17.5	8.2	91	1.3	.89	.91
JUL										
22...	0915	18	320	7.9	21.0	7.3	81	--	.66	--
AUG										
10...	1600	14	345	8.2	20.0	9.5	102	--	--	--
23...	1700	13	310	8.3	22.0	8.2	93	--	--	--

04102217 UNNAMED TRIBUTARY TO NORTH BRANCH PAW PAW RIVER NEAR PAW PAW, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NITRITE DISSOLVED (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
MAY									
08...	--	--	--	--	--	--	--	--	--
JUN									
03...	.010	--	.71	--	.030	--	.56	--	.59
JUL									
08...	.010	--	.89	--	.040	--	.33	--	.37
AUG									
05...	.020	--	.69	--	.030	--	.21	--	.24
SEP									
03...	.010	--	.80	--	.010	--	.26	--	.27
OCT									
14...	.010	--	.95	--	.050	--	.18	--	.23
DEC									
02...	.010	--	.91	--	.000	--	.15	--	.15
JAN , 1981									
07...	--	.010	--	1.3	--	.090	--	.09	--
FEB									
03...	.010	--	1.4	--	.070	--	.13	--	.20
MAR									
03...	.010	.010	.96	1.2	.070	.070	.25	.15	.32
APR									
07...	<.010	--	1.1	--	.030	--	.51	--	.54
MAY									
12...	.010	--	.50	--	.040	--	.71	--	.75
14...	--	--	--	--	--	--	--	--	--
JUN									
10...	<.010	--	.83	--	.080	--	.18	--	.26
JUL									
07...	<.010	--	.59	--	.010	--	.49	--	.50
AUG									
04...	<.010	<.010	.70	.69	.030	.020	.52	.35	.55
SEP									
15...	.020	--	.84	--	.030	--	.35	--	.38
OCT									
28...	.010	.010	1.0	1.0	.030	.050	.39	.45	.42
NOV									
17...	.010	--	1.1	--	.020	--	.39	--	.41
DEC									
08...	<.010	.010	1.1	1.1	.020	.020	.25	.09	.27
JAN , 1982									
19...	.020	--	1.3	--	.040	--	.39	--	.43
FEB									
17...	.020	--	1.2	--	.050	--	.33	--	.38
MAR									
09...	.010	.010	1.3	1.3	.040	.030	.18	.19	.22
16...	.010	--	.73	--	.030	--	.34	--	.37
APR									
20...	<.010	--	.99	--	.030	--	.43	--	.46
MAY									
12...	.020	--	.98	--	.030	--	1.1	--	1.10
JUN									
15...	.010	.010	.90	.92	.030	.020	.27	.38	.30
JUL									
22...	.010	--	.67	--	.040	--	.16	--	.20
AUG									
10...	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--

04102217 UNNAMED TRIBUTARY TO NORTH BRANCH PAW PAW RIVER NEAR PAW PAW, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN,NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITROGEN,AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
APR + 1980									
24...	--	--	--	--	--	--	--	4	.17
MAY									
08...	--	--	--	--	--	--	--	3	.11
JUN									
03...	--	--	1.3	.040	--	.010	--	10	--
JUL									
08...	--	--	1.3	.020	--	.010	--	6	.21
AUG									
05...	--	--	.93	.010	--	.000	--	4	.17
SEP									
03...	--	--	1.1	.030	--	.000	--	5	.20
OCT									
14...	--	--	1.2	.020	--	.010	--	9	.32
DEC									
02...	--	--	1.1	.020	--	.000	--	13	.70
JAN + 1981									
07...	--	.18	--	--	.010	--	.020	25	.81
FEB									
03...	--	--	1.6	.020	--	<.010	--	9	.34
MAR									
03...	.10	.22	1.3	.020	<.010	<.010	<.010	5	.19
APR									
07...	--	--	1.6	.020	--	<.010	--	4	.14
MAY									
12...	--	--	1.3	.030	--	<.010	--	4	.36
14...	--	--	--	--	--	--	--	6	--
JUN									
10...	--	--	1.1	.010	--	<.010	--	10	.40
JUL									
07...	--	--	1.1	.020	--	<.010	--	6	.19
AUG									
04...	.18	.37	1.3	.010	.050	.010	<.010	2	.06
SEP									
15...	--	--	1.2	.010	--	<.010	--	5	.13
OCT									
28...	--	.50	1.4	<.010	<.010	<.010	<.010	5	.15
NOV									
17...	--	--	1.5	.030	--	<.010	--	6	.19
DEC									
08...	--	.11	1.4	.010	<.010	<.010	<.010	6	.21
JAN + 1982									
19...	--	--	1.7	.020	--	<.010	--	14	.45
FEB									
17...	--	--	1.6	<.010	--	<.010	--	1	.04
MAR									
09...	.00	.22	1.5	<.010	<.010	<.010	<.010	7	.21
16...	--	--	1.1	.030	--	.010	--	8	.78
APR									
20...	--	--	1.5	.010	--	<.010	--	2	.10
MAY									
12...	--	--	2.1	.030	--	.010	--	4	.16
JUN									
15...	.00	.40	1.2	.040	.010	.010	<.010	9	.34
JUL									
22...	--	--	.87	.050	--	.030	--	5	.24
AUG									
10...	--	--	--	--	--	--	--	1	.04
23...	--	--	--	--	--	--	--	8	.28

04102217 UNNAMED TRIBUTARY TO NORTH BRANCH PAW PAW RIVER NEAR PAW PAW, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)
MAY , 1981											
12...	1100	.90	22	140	2.0	37	12	3.9	.1	6	.7
AUG , 1982											
23...	1700	<1.0	16	180	20	46	16	5.6	.2	6	.4

DATE	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)
MAY , 1981											
12...	140	17	6.4	.1	6.8	.50	182	168	.25	16.2	--
AUG , 1982											
23...	161	19	8.9	.1	9.9	--	199	203	.27	--	40

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BORON, TOTAL RECOVERABLE (UG/L AS B)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)
MAY , 1981											
12...	0	--	--	1	<10	1	6	320	--	1	<4
AUG , 1982											
23...	2	200	50	--	10	<1	4	90	10	2	--

DATE	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
MAY , 1981										
12...	20	--	<.1	5	0	60	60	30	--	--
AUG , 1982										
23...	20	9	--	4	--	80	--	10	<.01	<1

04102217 UNNAMED TRIBUTARY TO NORTH BRANCH PAW PAW RIVER NEAR PAW PAW, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	PCB, DIS-SOLVED (UG/L)	PCN DISSOLV (UG/L)	ALDRIN, DIS-SOLVED (UG/L)	CHLOR-DANE, DIS-SOLVED (UG/L)	DDD, DIS-SOLVED (UG/L)	DDE, DIS-SOLVED (UG/L)	DDT, DIS-SOLVED (UG/L)	DI-AZINON, DIS-SOLVED (UG/L)	DI-ELDRIN DIS-SOLVED (UG/L)	ENDO-SULFAN DISSOLV (UG/L)
MAY , 1981											
12...	1100	<.1	<.10	<.01	<.10	<.01	<.01	<.01	<.01	<.01	<.01
AUG , 1982											
23...	1700	--	--	--	--	--	--	--	--	--	--

DATE	ENDRIN, DIS-SOLVED (UG/L)	ETHION DISSOLV (UG/L)	HEPTA-CHLOR, DIS-SOLVED (UG/L)	HEPTA-CHLOR EPOXIDE DIS-SOLVED (UG/L)	LINDANE DIS-SOLVED (UG/L)	MALA-THION, DIS-SOLVED (UG/L)	METHO-MYL TOTAL (UG/L)	METH-OXY-CHLOR DISSOLV (UG/L)	METHYL PARA-THION, DIS-SOLVED (UG/L)	METHYL-TRI-THION DISSOLV (UG/L)	MIREX, DIS-SOLVED (UG/L)
MAY , 1981											
12...	<.01	<.01	<.01	<.01	<.01	<.01	.0	<.01	<.01	<.01	<.01
AUG , 1982											
23...	--	--	--	--	--	--	--	--	--	--	--

DATE	PARA-THION, DIS-SOLVED (UG/L)	PER-THANE DISSOLV (UG/L)	PROPHAM TOTAL (UG/L)	SEVIN, TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	TOX-APHENE, DIS-SOLVED (UG/L)	TRI-THION DISSOLV (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
MAY , 1981										
12...	<.01	<.01	.0	.00	<.01	<1.0	<.01	.01	<.01	<.01
AUG , 1982										
23...	--	--	--	--	<.01	--	--	<.01	<.01	<.01

04102260 BRANDYWINE CREEK NEAR PAW PAW, MI

LOCATION.--Lat 42°16'50", long 85°53'53", in NE¼ sec.23, T.2 S., R.14 W., Van Buren County, Hydrologic Unit 04050001, at bridge on 38th Ave., 4.4 mi (7.1 km) north of Paw Paw.

DRAINAGE AREA.--32.2 mi² (83.4 km²).

PERIOD OF RECORD.--April 1980 to August 1982 (discontinued).

REMARKS.--Water-quality and sediment samples were collected once a month and during high flow for analysis. Discharge measurements were made at time of sampling. All data for period of record is published in this report.

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
APR , 1980										
24...	1345	21	278	--	9.5	--	--	--	--	--
MAY										
08...	1630	12	339	--	12.5	--	--	--	--	--
JUN										
03...	1345	89	233	--	18.0	--	--	--	1.7	--
JUL										
09...	0845	10	342	7.7	19.0	6.8	74	--	.54	--
AUG										
05...	1400	27	253	7.6	21.0	7.6	85	--	.33	--
SEP										
03...	1200	36	287	7.6	18.0	7.7	79	--	.32	--
OCT										
14...	1800	10	388	--	9.0	--	--	--	.46	--
DEC										
02...	1330	66	296	7.1	4.0	11.6	87	--	.96	--
JAN , 1981										
08...	1000	16	384	7.2	.0	11.5	77	.92	.60	.61
FEB										
03...	1450	22	370	7.4	.0	11.5	80	--	.72	--
19...	0915	342	153	7.2	.5	12.1	83	--	.23	--
MAR										
03...	1230	37	215	7.2	2.5	10.8	77	1.0	.54	.55
APR										
07...	1215	15	330	7.7	10.0	10.8	88	--	.44	--
MAY										
12...	1500	167	180	7.5	10.5	9.6	83	--	.53	--
14...	1545	--	--	--	--	--	--	--	--	--
JUN										
10...	0930	12	350	7.6	17.0	7.5	78	--	.49	--
JUL										
07...	1345	6.9	380	7.8	19.5	6.9	73	--	.38	--
AUG										
05...	0745	5.1	400	7.9	16.5	7.2	72	.65	.50	.50
SEP										
15...	1330	4.3	420	8.0	15.0	8.3	80	--	.44	--
OCT										
28...	1315	12	420	7.8	9.0	6.7	57	3.3	.55	.55
NOV										
17...	1320	7.7	390	8.1	8.0	11.0	92	--	.52	--
DEC										
09...	0915	18	310	7.9	1.5	--	--	1.2	.91	.92
JAN , 1982										
20...	0845	15	340	7.4	.0	10.4	70	--	.71	--
FEB										
17...	1130	18	325	7.4	1.5	--	--	--	.87	--
MAR										
09...	1330	15	325	7.6	1.5	11.8	83	1.3	.77	.79
16...	1500	259	120	7.1	3.0	11.8	88	--	1.3	--
APR										
20...	1215	29	260	7.8	12.0	9.8	91	--	.52	--
MAY										
12...	1315	9.6	365	8.2	19.0	8.8	95	--	.44	--
JUN										
15...	1215	8.9	380	7.8	16.0	7.6	84	1.1	.68	.67
JUL										
22...	1100	34	230	7.5	22.0	5.8	66	--	.43	--
AUG										
11...	0830	6.0	380	8.1	14.0	8.2	77	--	--	--
18...	1000	4.8	360	8.1	16.0	8.0	79	--	--	--

04102260 BRANDYWINE CREEK NEAR PAW PAW, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
MAY									
08...	--	--	--	--	--	--	--	--	--
JUN									
03...	.010	--	1.7	--	.250	--	1.1	--	1.30
JUL									
09...	.020	--	.56	--	.010	--	.62	--	.63
AUG									
05...	.010	--	.34	--	.010	--	.81	--	.82
SEP									
03...	.010	--	.33	--	.020	--	.59	--	.61
OCT									
14...	.010	--	.47	--	.040	--	.39	--	.43
DEC									
02...	.040	--	1.0	--	.200	--	.67	--	.87
JAN , 1981									
08...	.010	.000	.61	.61	.160	.160	.19	.15	.35
FEB									
03...	.010	--	.73	--	.170	--	.12	--	.29
19...	<.010	--	.23	--	.060	--	.38	--	.44
MAR									
03...	<.010	<.010	.54	.55	.070	.050	.37	.42	.44
APR									
07...	.010	--	.45	--	.070	--	.64	--	.71
MAY									
12...	.020	--	.55	--	.070	--	1.0	--	1.10
14...	--	--	--	--	--	--	--	--	--
JUN									
10...	<.010	--	.49	--	.080	--	.38	--	.46
JUL									
07...	<.010	--	.38	--	.050	--	.51	--	.56
AUG									
05...	<.010	<.010	.50	.50	.020	.020	5.1	.13	5.10
SEP									
15...	.010	--	.45	--	.030	--	.29	--	.32
OCT									
28...	.090	.090	.64	.64	2.20	2.00	1.3	.70	3.50
NOV									
17...	.010	--	.53	--	.020	--	.30	--	.32
DEC									
09...	.010	<.010	.92	.92	.100	.100	.03	.22	.13
JAN , 1982									
20...	.040	--	.75	--	.100	--	.56	--	.66
FEB									
17...	.020	--	.89	--	.150	--	14	--	14.0
MAR									
09...	<.010	<.010	.77	.79	.090	.070	.26	.40	.35
16...	.030	--	1.3	--	.140	--	.78	--	.92
APR									
20...	.010	--	.53	--	.040	--	.68	--	.72
MAY									
12...	.020	--	.46	--	.030	--	.82	--	.85
JUN									
15...	.020	.010	.70	.68	.020	.020	.38	.38	.40
JUL									
22...	.020	--	.45	--	.060	--	.64	--	.70
AUG									
11...	--	--	--	--	--	--	--	--	--
18...	--	--	--	--	--	--	--	--	--

04102260 BRANDYWINE CREEK NEAR PAW PAW, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN,NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITROGEN,AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
MAY									
08...	--	--	--	--	--	--	--	6	.19
JUN									
03...	--	--	3.0	.220	--	.110	--	80	--
JUL									
09...	--	--	1.2	.060	--	.030	--	11	.30
AUG									
05...	--	--	1.2	.150	--	.050	--	10	.73
SEP									
03...	--	--	.94	.130	--	.050	--	21	2.0
OCT									
14...	--	--	.90	.040	--	.020	--	2	.05
DEC									
02...	--	--	1.9	.200	--	.110	--	60	11
JAN , 1981									
08...	--	.31	.96	.030	.020	.010	.010	6	.26
FEB									
03...	--	--	1.0	.050	--	.020	--	6	.36
19...	--	--	.67	.110	--	.020	--	68	63
MAR									
03...	.00	.47	.98	.030	.020	.010	<.010	8	.80
APR									
07...	--	--	1.2	.050	--	.020	--	9	.36
MAY									
12...	--	--	1.7	.110	--	.020	--	30	14
14...	--	--	--	--	--	--	--	20	--
JUN									
10...	--	--	.95	.040	--	.030	--	31	1.0
JUL									
07...	--	--	.94	.060	--	.030	--	9	.17
AUG									
05...	5.0	.15	5.6	.050	.020	<.010	.030	11	.15
SEP									
15...	--	--	.77	.030	--	.020	--	--	--
OCT									
28...	--	2.7	4.1	.110	.010	.050	<.010	5	.16
NOV									
17...	--	--	.85	.040	--	<.010	--	3	.06
DEC									
09...	--	.32	1.1	.030	.020	.030	.020	4	.19
JAN , 1982									
20...	--	--	1.4	.040	--	.020	--	3	.12
FEB									
17...	--	--	15	.040	--	.020	--	4	.19
MAR									
09...	.00	.47	1.1	.030	.020	.030	.010	3	.12
16...	--	--	2.2	.120	--	.080	--	52	36
APR									
20...	--	--	1.3	.040	--	.020	--	12	.94
MAY									
12...	--	--	1.3	.050	--	.030	--	9	.23
JUN									
15...	.00	.40	1.1	.070	.040	.030	.020	8	.19
JUL									
22...	--	--	1.2	.200	--	.160	--	22	2.0
AUG									
11...	--	--	--	--	--	--	--	7	.11
18...	--	--	--	--	--	--	--	14	.18

WATER-QUALITY DATA

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)
MAY , 1981											
12...	1500	11	70	88	7.0	22	8.0	2.8	.1	6	1.9
AUG , 1982											
18...	1000	3.0	19	210	24	54	19	4.7	.2	5	.4

DATE	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)
MAY , 1981											
12...	81	9.5	6.2	.1	4.1	1.4	127	103	.17	57.3	--
AUG , 1982											
18...	189	27	8.7	.2	9.6	--	277	237	.38	3.6	120

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BORON, TOTAL RECOVERABLE (UG/L AS B)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)
MAY , 1981											
12...	0	--	--	1	<10	1	10	1000	--	26	<4
AUG , 1982											
18...	3	<100	10	--	10	2	5	400	42	4	--

DATE	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
MAY , 1981										
12...	40	--	<.1	4	0	50	40	40	--	--
AUG , 1982										
18...	70	45	--	4	--	90	--	<10	<.01	<1

STREAMS TRIBUTARY TO LAKE MICHIGAN

04102260 BRANDYWINE CREEK NEAR PAW PAW, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	PCB, DIS-SOLVED (UG/L)	PCN DISSOLV (UG/L)	ALDRIN, DIS-SOLVED (UG/L)	CHLOR-DANE, DIS-SOLVED (UG/L)	DDD, DIS-SOLVED (UG/L)	DDE, DIS-SOLVED (UG/L)	DDT, DIS-SOLVED (UG/L)	DI-AZINON, DIS-SOLVED (UG/L)	DI-ELDRIN DIS-SOLVED (UG/L)	ENDO-SULFAN DISSOLV (UG/L)
MAY , 1981											
12...	1500	<.1	<.10	<.01	<.10	<.01	<.01	<.01	<.01	<.01	<.01
AUG , 1982											
18...	1000	--	--	--	--	--	--	--	--	--	--

DATE	ENDRIN, DIS-SOLVED (UG/L)	ETHION DISSOLV (UG/L)	HEPTA-CHLOR, DIS-SOLVED (UG/L)	HEPTA-CHLOR EPOXIDE DIS-SOLVED (UG/L)	LINDANE DIS-SOLVED (UG/L)	MALA-THION, DIS-SOLVED (UG/L)	METHO-MYL TOTAL (UG/L)	METH-OXY-CHLOR DISSOLV (UG/L)	METHYL PARA-THION, DIS-SOLVED (UG/L)	METHYL-TRI-THION DISSOLV (UG/L)	MIREX, DIS-SOLVED (UG/L)
MAY , 1981											
12...	<.01	<.01	<.01	<.01	<.01	<.01	.0	<.01	<.01	<.01	<.01
AUG , 1982											
18...	--	--	--	--	--	--	--	--	--	--	--

DATE	PARA-THION, DIS-SOLVED (UG/L)	PER-THANE DISSOLV (UG/L)	PROPHAM TOTAL (UG/L)	SEVIN, TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	TOX-APHENE, DIS-SOLVED (UG/L)	TRI-THION DISSOLV (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
MAY , 1981										
12...	<.01	<.01	.0	.00	<.01	<1.0	<.01	<.01	<.01	<.01
AUG , 1982										
18...	--	--	--	--	<.01	--	--	<.01	<.01	<.01

04102320 PAW PAW RIVER NEAR PAW PAW, MI

LOCATION.--Lat 42°16'01", long 85°56'15", in SW¼ NW¼ sec.27, T.2 S., R.14 W., Van Buren County, Hydrologic Unit 04050001, on downstream side of 40th Street bridge, 3.1 mi (5.0 km) northwest of Paw Paw, and 0.7 mi (1.1 km) downstream from confluence of North Branch and South Branch.

DRAINAGE AREA.--195 mi² (505 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1980 to September 1982 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 685 ft (209 m), from topographic map (nearest 10 ft).

REMARKS.--Water-discharge records good except those for period of no gage-height record, Dec. 18 to Feb. 15, which are fair. Occasional regulation caused by dam on South Branch Paw Paw River.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,540 ft³/s (43.6 m³/s) Mar. 14, 1982, gage height, 6.26 ft (1.908 m); minimum, 108 ft³/s (3.06 m³/s) Sept. 29, 1980; minimum gage height, 0.91 ft (0.277 m) Aug. 21, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,540 ft³/s (43.6 m³/s) Mar. 14, gage height, 6.26 ft (1.908 m); minimum, 113 ft³/s (3.20 m³/s) Sept. 5, 6, gage height, 1.15 ft (0.351 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	349	189	333	200	220	214	575	240	371	173	170	126
2	438	193	314	200	215	213	521	233	395	164	172	129
3	392	238	305	205	211	206	455	220	379	181	215	138
4	314	235	270	245	205	174	489	215	325	215	221	131
5	267	212	239	380	205	184	454	213	265	182	176	119
6	227	212	229	450	200	209	403	218	243	184	160	113
7	233	212	224	410	200	209	405	221	248	191	172	118
8	220	204	222	350	200	197	384	234	229	163	211	129
9	212	200	219	300	200	193	372	230	221	138	185	131
10	205	195	213	270	195	193	384	221	210	140	153	126
11	200	190	199	250	200	224	407	215	212	196	169	119
12	196	186	189	240	200	320	432	206	218	251	170	117
13	188	184	187	230	200	557	469	193	200	241	158	117
14	184	182	189	225	200	1280	454	189	190	241	156	117
15	183	181	190	220	205	1260	408	191	185	259	152	124
16	206	179	180	215	219	1070	374	194	203	204	150	137
17	209	158	156	215	229	1040	340	185	213	538	143	147
18	222	123	160	210	229	970	348	164	202	1220	135	173
19	261	132	165	210	227	785	347	183	201	850	133	192
20	301	182	190	210	238	590	337	201	219	569	134	157
21	294	244	190	210	248	780	320	220	231	502	149	153
22	294	275	205	210	248	714	293	272	238	411	138	144
23	294	270	195	210	248	614	276	336	217	305	124	136
24	285	284	190	210	249	498	269	390	182	289	129	148
25	260	287	175	215	239	513	262	357	176	251	142	149
26	241	287	190	215	226	490	255	270	175	195	142	146
27	212	313	200	220	225	440	252	246	181	202	143	147
28	190	353	200	220	221	390	242	323	189	201	133	147
29	200	374	200	220	---	342	227	401	203	193	130	147
30	197	362	195	220	---	325	240	401	185	182	130	147
31	193	---	195	220	---	302	---	395	---	179	125	---
TOTAL	7707	6836	6508	7405	6102	15706	11002	7777	6895	9210	4820	4124
MEAN	249	228	210	245	218	507	367	251	230	297	155	137
MAX	438	374	333	450	249	1280	575	401	395	1220	221	192
MIN	184	123	156	200	195	174	227	164	175	138	124	113
CFSM	1.28	1.17	1.08	1.26	1.12	2.60	1.88	1.29	1.18	1.52	.80	.70
IN.	1.47	1.30	1.24	1.45	1.16	3.00	2.10	1.48	1.32	1.76	.92	.79

CAL YR 1981 TOTAL 86889 MEAN 236 MAX 1000 MIN 113 CFSM 1.21 IN 16.42
WTR YR 1982 TOTAL 94292 MEAN 258 MAX 1280 MIN 113 CFSM 1.32 IN 17.99

04102320 PAW PAW RIVER NEAR PAW PAW, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--April 1980 to August 1982 (discontinued).

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: September 1980 to August 1982.
SUSPENDED-SEDIMENT DISCHARGE: July 1980 to August 1982.

REMARKS.--Sediment samples were collected on an approximate daily basis by a local observer. Water-quality samples were collected about once a month. Daily water temperature record based on once-daily measurement at 1700 hours.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum daily, 25.0°C Aug. 19, 1981; minimum daily, 0.0°C on many days during winter periods.
SEDIMENT CONCENTRATIONS: Maximum daily mean, 204 mg/L May 5, 1981; minimum daily mean, 1 mg/L on many days each year.
SEDIMENT LOADS: Maximum daily, 140 tons (127 tonnes) May 5, 1981; minimum daily, 0.52 tons (0.47 tonnes) Nov. 25, 1980, Mar. 9, 1982.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum daily recorded, 24.0°C on several days in July and Aug.; minimum daily recorded, 0.0°C Jan. 20.
SEDIMENT CONCENTRATIONS: Maximum daily mean, 34 mg/L Mar. 14; minimum daily mean, 1 mg/L on many days.
SEDIMENT LOADS: Maximum daily, 135 tons (122 tonnes) Mar. 14; minimum daily, 0.52 tons (0.47 tonnes) Mar. 9.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
OCT										
02...	0950	457	--	--	--	--	--	--	--	--
02...	1730	445	440	--	--	--	--	1.3	.68	.62
03...	0830	442	460	--	--	--	--	1.9	.80	.74
05...	0845	298	460	--	--	--	--	--	--	--
13...	1115	180	455	7.9	11.5	--	--	--	--	--
28...	1530	197	460	7.9	9.0	9.9	85	1.2	.74	.72
NOV										
17...	1530	160	440	8.0	8.0	10.6	89	--	.73	--
DEC										
09...	1200	219	440	8.1	3.0	--	--	--	.93	--
JAN										
20...	1000	210	440	7.3	.0	11.5	78	--	.91	--
FEB										
03...	1400	211	430	8.1	.5	--	--	--	--	--
17...	1330	231	400	7.6	2.5	--	--	--	.86	--
MAR										
09...	1425	196	425	7.7	2.5	13.0	94	1.3	.89	.90
13...	1430	569	300	7.6	2.0	11.5	82	--	1.1	--
14...	1900	1470	225	7.3	1.0	11.1	77	--	1.3	--
15...	1530	1240	255	7.5	.5	11.2	76	2.0	1.5	1.50
18...	1500	970	280	7.6	3.0	12.2	90	--	1.5	--
25...	1730	528	--	--	6.0	--	--	--	--	--
APR										
20...	1430	337	415	8.3	13.5	12.0	114	--	.65	--
MAY										
12...	1515	202	440	8.3	21.0	8.8	98	--	.57	--
JUN										
15...	1315	173	480	8.1	19.5	7.6	84	1.2	.68	.73
JUL										
22...	1315	404	400	7.7	22.0	5.3	60	--	.52	--
AUG										
11...	1015	161	420	8.0	18.0	7.9	81	--	--	--
18...	1200	140	365	8.1	20.0	8.3	89	--	--	--

04102320 PAW PAW RIVER NEAR PAW PAW, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)
OCT									
02...	--	--	--	--	--	--	--	--	--
02...	.010	.010	.69	.63	.040	.020	.78	.62	.82
03...	.020	.020	.82	.76	.030	.030	.85	.85	.88
05...	--	--	--	--	--	--	--	--	--
13...	--	--	--	--	--	--	--	--	--
28...	.020	.020	.76	.74	.040	.040	.62	.45	.66
NOV									
17...	.010	--	.74	--	.040	--	.13	--	.17
DEC									
09...	.010	.010	.94	.94	.070	.070	--	--	<.10
JAN									
20...	.030	--	.94	--	.110	--	.44	--	.55
FEB									
03...	--	--	--	--	--	--	--	--	--
17...	.020	--	.88	--	.130	--	.37	--	.50
MAR									
09...	<.010	<.010	.89	.90	.070	.060	.16	.29	.23
13...	.020	--	1.1	--	.150	--	.41	--	.56
14...	.020	--	1.3	--	.120	--	.47	--	.59
15...	.030	.020	1.5	1.5	.110	.110	.55	.34	.66
18...	.020	--	1.5	--	.070	--	.38	--	.45
25...	--	--	--	--	--	--	--	--	--
APR									
20...	.010	--	.66	--	.040	--	.45	--	.49
MAY									
12...	.020	--	.59	--	.040	--	.61	--	.65
JUN									
15...	.020	.020	.70	.75	.020	.020	.68	.38	.70
JUL									
22...	.030	--	.55	--	.060	--	.84	--	.90
AUG									
11...	--	--	--	--	--	--	--	--	--
18...	--	--	--	--	--	--	--	--	--

DATE	NITRO-GEN,NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)
OCT									
02...	--	--	--	--	--	--	--	4	4.9
02...	--	.64	1.5	<.010	<.010	.020	.010	4	4.8
03...	--	.88	1.7	<.010	<.010	.010	.010	5	6.0
05...	--	--	--	--	--	--	--	5	4.0
13...	--	--	--	--	--	--	--	4	1.9
28...	--	.50	1.4	.010	<.010	<.010		1	.53
NOV									
17...	--	--	.91	.050	--	<.010	--	5	2.2
DEC									
09...	--	<.10	--	<.010	<.010	.020	.020	2	1.2
JAN									
20...	--	--	1.5	.020	--	.010	--	3	1.7
FEB									
03...	--	--	--	--	--	--	--	5	2.8
17...	--	--	1.4	.010	--	.010	--	3	1.9
MAR									
09...	.00	.35	1.1	.020	<.010	<.010	<.010	6	3.2
13...	--	--	1.7	.060	--	.040	--	18	28
14...	--	--	1.9	.070	--	.040	--	34	135
15...	.21	.45	2.2	.060	.030	.050	.020	16	54
18...	--	--	2.0	.050	--	.020	--	8	21
25...	--	--	--	--	--	--	--	2	2.9
APR									
20...	--	--	1.2	.020	--	.010	--	5	4.5
MAY									
12...	--	--	1.2	.030	--	.010	--	7	3.8
JUN									
15...	.30	.40	1.4	.050	.020	.020	<.010	18	8.4
JUL									
22...	--	--	1.5	.060	--	.040	--	6	6.5
AUG									
11...	--	--	--	--	--	--	--	11	4.8
18...	--	--	--	--	--	--	--	--	--

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM
AUG 18...	1200	2.7	19	210	24	52	19	9.6	.3	9

DATE	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)
AUG 18...	.5	184	32	11	.2	8.5	258	243	.35

DATE	SOLIDS, DISSOLVED (TONS PER DAY)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BORON, TOTAL RECOVERABLE (UG/L AS B)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)
AUG 18...	97.5	100	3	100	30	<10	1	5	280

DATE	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
AUG 18...	15	4	50	13	5	100	<10	<.01	<1

DATE	TIME	SILVEX, TOTAL (UG/L)	2,4-D, TOTAL (UG/L)	2,4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
AUG 18...	1200	<.01	.01	<.01	<.01

04102320 PAW PAW RIVER NEAR PAW PAW, MI--CONTINUED

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	8	7.5	5	2.6	3	2.7	4	2.2	7	4.2	8	4.6
2	5	5.9	5	2.6	4	3.4	4	2.2	5	2.9	11	6.3
3	2	2.1	6	3.9	2	1.6	4	2.2	5	2.8	10	5.6
4	17	14	5	3.2	3	2.2	4	2.6	5	2.8	8	3.8
5	4	2.9	4	2.3	4	2.6	3	3.1	6	3.3	6	3.0
6	3	1.8	7	4.0	1	.62	14	17	22	12	5	2.8
7	1	.63	4	2.3	1	.60	13	14	15	8.1	5	2.8
8	3	1.9	4	2.2	1	.60	12	11	11	5.9	5	2.7
9	2	1.1	4	2.2	3	1.8	10	8.1	9	4.9	1	.52
10	2	1.1	4	2.1	3	1.7	9	6.6	7	3.7	7	3.6
11	2	1.1	4	2.1	6	3.2	8	5.4	7	3.8	8	4.8
12	2	1.1	4	2.0	3	1.5	7	4.5	4	2.2	20	17
13	4	2.0	5	2.5	2	1.0	6	3.7	4	2.2	18	27
14	4	2.0	5	2.5	3	1.5	6	3.6	5	2.7	34	118
15	4	2.1	5	2.4	3	1.5	6	3.6	6	3.3	28	95
16	4	2.2	5	2.4	4	1.9	12	7.0	5	3.0	9	26
17	4	2.2	5	2.3	13	5.5	6	3.5	5	3.1	12	34
18	5	3.0	9	3.0	9	3.9	5	2.8	5	3.1	10	26
19	8	5.6	5	1.8	12	5.3	6	3.4	5	3.1	10	21
20	4	3.3	5	2.5	4	2.1	6	3.4	6	3.9	10	19
21	4	3.2	6	4.0	4	2.1	6	3.4	6	4.0	10	21
22	2	1.6	11	8.2	4	2.2	9	5.1	5	3.3	10	19
23	2	1.6	3	2.2	4	2.1	3	1.7	5	3.3	6	9.9
24	3	2.3	3	2.3	4	2.1	5	2.8	5	3.4	5	6.7
25	4	2.9	3	2.3	4	1.9	3	1.7	7	4.5	4	5.5
26	5	3.3	2	1.5	4	2.1	6	3.5	6	3.7	4	5.3
27	8	3.4	2	1.7	4	2.2	6	3.6	4	2.4	4	4.8
28	7	3.8	5	4.8	4	2.2	6	3.6	6	3.6	3	3.2
29	3	1.6	8	8.1	4	2.2	6	3.6	---	---	3	2.8
30	4	2.1	8	7.8	4	2.1	6	3.6	---	---	3	2.6
31	5	2.6	---	---	4	2.1	6	3.6	---	---	3	3.2
TOTAL	---	91.93	---	93.8	---	68.52	---	146.1	---	109.2	---	507.52

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	6	9.3	9	5.8	7	7.0	23	11	15	6.9		
2	6	8.4	18	11	7	7.5	20	8.9	16	7.4		
3	6	7.4	10	5.9	11	11	19	9.3	8	4.6		
4	5	6.6	8	4.6	12	11	13	7.5	11	6.6		
5	5	6.3	6	3.5	13	9.3	12	5.9	11	5.2		
6	4	4.4	9	5.3	15	9.8	12	6.0	10	4.3		
7	6	6.6	7	4.2	16	11	11	5.7	14	6.5		
8	6	6.2	11	6.9	16	9.9	10	4.4	8	4.6		
9	6	6.0	9	5.6	16	9.5	13	4.8	10	5.0		
10	5	5.2	9	5.4	16	9.1	10	3.8	10	4.1		
11	5	5.5	8	4.6	15	8.6	18	9.5	11	5.0		
12	5	5.8	7	3.9	15	8.8	20	14	11	5.0		
13	4	5.1	10	5.2	15	8.1	23	15	10	4.3		
14	3	3.7	11	5.6	15	7.3	14	9.1	10	4.2		
15	2	2.2	12	6.2	16	8.0	20	14	8	3.3		
16	2	2.0	10	5.2	18	9.9	27	15	---	---		
17	2	1.8	11	5.5	22	13	32	46	---	---		
18	3	2.8	11	4.9	24	13	23	76	---	---		
19	4	3.7	13	6.4	21	11	16	37	---	---		
20	5	4.5	14	7.6	28	17	10	15	---	---		
21	3	2.6	10	5.9	20	12	10	14	---	---		
22	7	5.5	10	7.3	27	17	12	13	---	---		
23	6	4.5	13	12	26	15	10	8.2	---	---		
24	6	4.3	15	16	29	14	9	7.0	---	---		
25	4	2.8	17	16	29	14	11	7.5	---	---		
26	5	3.4	24	17	12	5.7	14	7.4	---	---		
27	12	8.2	18	12	18	8.8	14	7.6	---	---		
28	14	9.1	10	8.7	16	8.2	14	7.6	---	---		
29	9	5.5	9	9.7	14	7.7	13	6.8	---	---		
30	7	4.5	9	9.7	26	13	13	6.4	---	---		
31	---	---	13	14	---	---	13	6.3	---	---		
TOTAL	---	153.9	---	241.6	---	315.2	---	409.7				

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13.0	11.0	4.0	---	2.0	5.0	---	18.0	---	---	23.0	
2	12.0	11.0	5.0	---	---	4.0	---	20.0	19.0	20.0	23.0	
3	12.0	10.0	5.0	---	---	4.0	---	19.0	15.0	20.0	23.0	
4	11.0	10.0	5.0	---	2.0	---	---	---	---	21.0	23.0	
5	12.0	9.0	5.0	2.0	1.0	---	---	15.0	---	---	23.0	
6	13.0	9.0	---	3.0	---	4.0	---	15.0	---	---	---	
7	---	8.0	5.0	---	---	---	---	16.0	---	---	24.0	
8	---	9.0	4.0	---	---	---	---	16.0	22.0	21.0	23.0	
9	11.0	8.0	3.0	---	---	---	---	16.0	---	21.0	22.0	
10	12.0	---	3.0	3.0	---	4.0	---	17.0	---	21.0	22.0	
11	14.0	---	3.0	---	1.0	6.0	---	---	---	23.0	21.0	
12	---	---	---	---	2.0	3.0	---	---	---	---	21.0	
13	---	---	4.0	---	---	---	---	18.0	---	24.0	21.0	
14	---	---	---	2.0	---	3.0	---	---	21.0	24.0	22.[illegible]	
15	---	---	---	---	4.0	3.0	---	17.0	19.0	---	22.0	
16	---	---	3.0	2.0	4.0	---	---	22.0	19.0	24.0	---	
17	11.0	---	3.0	2.0	3.0	---	---	22.0	19.0	24.0	---	
18	10.0	7.0	2.0	2.0	3.0	5.0	---	22.0	19.0	24.0	---	
19	10.0	8.0	2.0	1.0	---	---	---	---	19.0	---	---	
20	9.0	7.0	2.0	.0	4.0	---	---	22.0	19.0	24.0	---	
21	9.0	7.0	2.0	---	4.0	---	---	---	19.0	24.0	---	
22	---	6.0	---	---	5.0	---	---	---	19.0	24.0	---	
23	---	5.0	---	1.0	4.0	---	---	---	20.0	24.0	---	
24	---	4.0	---	1.0	3.0	---	16.0	---	20.0	24.0	---	
25	---	---	---	1.0	4.0	---	16.0	---	20.0	---	---	
26	---	---	---	1.0	4.0	---	16.0	16.0	20.0	24.0	---	
27	---	5.0	---	---	5.0	---	15.0	17.0	20.0	---	---	
28	10.0	---	---	---	5.0	---	15.0	---	---	---	---	
29	12.0	---	---	---	---	---	15.0	---	20.0	---	---	
30	11.0	5.0	---	---	---	---	17.0	---	20.0	23.0	---	
31	11.0	---	---	2.0	---	---	---	20.0	---	23.0	---	

04102370 BRUSH CREEK AT LAWRENCE, MI

LOCATION.--Lat 42°13'10", long 86°02'36", in SW¼ sec.10, T.3 S., R.15 W., Van Buren County, Hydrologic Unit 04050001, at bridge on Red Arrow Highway at Lawrence.

DRAINAGE AREA.--39.9 mi² (103.3 km²).

PERIOD OF RECORD.--April 1980 to August 1982 (discontinued).

REMARKS.--Water-quality and sediment samples were collected once a month and during high flow for analysis. Discharge measurements were made at time of sampling. All data for period of record is published in this report.

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
APR , 1980										
24...	1010	38	429	--	10.0	--	--	--	--	--
MAY										
09...	0905	31	400	--	10.0	--	--	--	--	--
JUN										
03...	1750	81	283	--	17.5	--	--	--	1.4	--
JUL										
09...	1420	37	371	7.6	18.0	8.1	87	--	.80	--
AUG										
06...	1050	32	387	7.7	17.0	7.7	85	--	.74	--
SEP										
04...	0815	31	394	7.9	16.0	8.2	81	--	.78	--
OCT										
14...	1640	25	380	--	10.0	--	--	--	.76	--
DEC										
03...	1230	51	394	6.8	2.0	13.1	89	--	.86	--
JAN , 1981										
09...	0930	28	418	7.6	.0	13.6	91	1.3	1.1	.99
FEB										
04...	1240	37	400	7.6	.0	11.8	80	--	1.2	--
19...	1430	162	217	7.4	1.0	11.9	83	--	.24	--
MAR										
04...	0830	42	340	7.8	5.0	12.0	92	1.4	1.2	1.10
APR										
07...	1430	29	400	7.9	10.5	11.2	91	--	.84	--
MAY										
13...	1005	122	272	7.5	10.0	9.0	--	--	.97	--
14...	1620	--	--	--	--	--	--	--	--	--
JUN										
10...	1330	38	390	7.9	16.0	8.2	83	--	--	--
JUL										
07...	1510	24	420	7.9	18.5	8.3	89	--	.83	--
AUG										
05...	1215	22	400	7.9	18.0	8.6	90	--	.83	--
SEP										
16...	1100	21	410	8.0	13.5	8.7	82	--	.77	--
OCT										
29...	0945	25	495	7.9	8.0	10.4	87	.80	.80	.78
NOV										
18...	0845	25	400	8.2	8.0	10.3	87	--	.87	--
DEC										
09...	1345	37	380	8.0	3.0	--	--	--	.99	--
JAN , 1982										
20...	1215	34	400	7.6	.0	13.7	93	--	1.3	--
FEB										
17...	1500	34	400	7.8	4.0	--	--	--	1.1	--
MAR										
10...	0930	32	400	7.7	3.0	11.9	86	1.5	1.2	1.20
14...	1645	186	180	7.3	1.0	11.3	78	--	1.4	--
17...	0900	225	170	7.8	1.5	11.8	84	1.5	1.2	1.10
APR										
20...	1615	45	360	8.1	12.5	10.3	96	--	.92	--
MAY										
12...	1630	31	410	8.2	19.0	9.0	97	--	.82	--
JUN										
15...	1445	31	410	7.7	16.5	8.6	96	1.3	.98	.96
JUL										
22...	1445	42	350	7.9	20.5	7.4	81	--	.70	--
AUG										
11...	1250	25	410	8.0	15.5	9.0	88	--	--	--
18...	1430	21	340	8.2	17.5	8.9	91	--	--	--

04102370 BRUSH CREEK AT LAWRENCE, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
MAY									
09...	--	--	--	--	--	--	--	--	--
JUN									
03...	.010	--	1.4	--	.130	--	1.2	--	1.30
JUL									
09...	.020	--	.82	--	.040	--	.68	--	.72
AUG									
06...	.010	--	.75	--	.080	--	.23	--	.31
SEP									
04...	.010	--	.79	--	.030	--	.22	--	.25
OCT									
14...	.010	--	.77	--	.010	--	.15	--	.16
DEC									
03...	.010	--	.87	--	.030	--	.39	--	.42
JAN , 1981									
09...	.020	.010	1.1	1.0	.060	.050	.22	.20	.28
FEB									
04...	.010	--	1.2	--	.080	--	.30	--	.38
19...	<.010	--	.24	--	.040	--	.59	--	.63
MAR									
04...	.010	.010	1.2	1.1	.120	.070	.28	.23	.40
APR									
07...	.010	--	.85	--	.040	--	.36	--	.40
MAY									
13...	.030	--	1.0	--	.230	--	.87	--	1.10
14...	--	--	--	--	--	--	--	--	--
JUN									
10...	--	--	--	--	--	--	--	--	--
JUL									
07...	.010	--	.84	--	.060	--	.30	--	.36
AUG									
05...	<.010	--	.83	--	.030	--	.27	--	.30
SEP									
16...	.010	--	.78	--	.040	--	.36	--	.40
OCT									
29...	<.010	<.010	.80	.78	.050	.040	.23	.20	.28
NOV									
18...	<.010	--	.87	--	.030	--	.42	--	.45
DEC									
09...	.010	.010	1.0	1.0	.090	.070	--	--	<.10
JAN , 1982									
20...	.050	--	1.3	--	.080	--	.40	--	.48
FEB									
17...	.030	--	1.1	--	.090	--	9.1	--	9.20
MAR									
10...	.010	.010	1.2	1.2	.100	.090	.29	.24	.39
14...	.040	--	1.4	--	.180	--	.57	--	.75
17...	.030	.020	1.2	1.1	.110	.060	.52	.35	.63
APR									
20...	.020	--	.94	--	.070	--	.64	--	.71
MAY									
12...	.020	--	.84	--	.040	--	.71	--	.75
JUN									
15...	.020	.020	1.0	.98	.020	.010	.58	.29	.60
JUL									
22...	.020	--	.72	--	.060	--	.54	--	.60
AUG									
11...	--	--	--	--	--	--	--	--	--
18...	--	--	--	--	--	--	--	--	--

04102370 BRUSH CREEK AT LAWRENCE, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN,NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITROGEN,AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
APR , 1980									
24...	--	--	--	--	--	--	--	14	1.4
MAY									
09...	--	--	--	--	--	--	--	13	1.1
JUN									
03...	--	--	2.7	.210	--	.030	--	206	45
JUL									
09...	--	--	1.5	.060	--	.030	--	42	4.2
AUG									
06...	--	--	1.1	.050	--	.010	--	23	2.0
SEP									
04...	--	--	1.0	.050	--	.010	--	24	2.0
OCT									
14...	--	--	.93	.030	--	.010	--	4	.27
DEC									
03...	--	--	1.3	.050	--	.020	--	14	1.9
JAN , 1981									
09...	--	.25	1.4	.030	<.010	.020	.010	11	.83
FEB									
04...	--	--	1.6	.050	--	.020	--	11	1.1
19...	--	--	.87	.100	--	<.010	--	123	54
MAR									
04...	.10	.30	1.6	.030	.020	.020	<.010	32	3.6
APR									
07...	--	--	1.3	.030	--	.010	--	5	.39
MAY									
13...	--	--	2.1	.110	--	.050	--	50	16
14...	--	--	--	--	--	--	--	43	--
JUN									
10...	--	--	--	--	--	--	--	53	5.4
JUL									
07...	--	--	1.2	.040	--	.050	--	7	.45
AUG									
05...	--	--	1.1	.040	--	<.010	--	10	.59
SEP									
16...	--	--	1.2	.040	--	.020	--	14	.79
OCT									
29...	--	.24	1.1	.030	.010	.020	.010	3	.20
NOV									
18...	--	--	1.3	.010	--	<.010	--	5	.34
DEC									
09...	--	<.10	--	.020	<.010	.020	.020	7	.70
JAN , 1982									
20...	--	--	1.8	.030	--	.010	--	12	1.1
FEB									
17...	--	--	10	.030	--	.010	--	7	.64
MAR									
10...	.06	.33	1.6	.030	.020	.020	<.010	8	.69
14...	--	--	2.2	.150	--	.070	--	155	78
17...	.22	.41	1.8	.090	.040	.050	.020	114	69
APR									
20...	--	--	1.7	.030	--	.020	--	13	1.6
MAY									
12...	--	--	1.6	.040	--	.020	--	11	.92
JUN									
15...	.30	.30	1.6	.080	.020	.030	.010	27	2.3
JUL									
22...	--	--	1.3	.080	--	.060	--	27	3.1
AUG									
11...	--	--	--	--	--	--	--	49	3.3
18...	--	--	--	--	--	--	--	4	.23

04102370 BRUSH CREEK AT LAWRENCE, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)
MAY , 1981											
13...	1005	8.0	65	140	11	35	13	3.7	.1	5	2.5
AUG , 1982											
18...	1430	2.2	19	210	20	53	20	6.4	.2	6	.5

DATE	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)
MAY , 1981											
13...	130	16	7.4	.1	7.0	1.9	184	163	.25	60.6	--
AUG , 1982											
18...	195	24	9.6	.2	11	--	281	242	.38	15.9	60

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BORON, TOTAL RECOVERABLE (UG/L AS B)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)
MAY , 1981											
13...	1	--	--	1	<10	1	6	1500	--	1	<4
AUG , 1982											
18...	3	<100	20	--	10	2	4	330	20	2	--

DATE	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
MAY , 1981										
13...	70	--	.3	7	0	60	50	30	--	--
AUG , 1982										
18...	60	41	--	3	--	100	--	10	<.01	<1

DATE	TIME	SILVEX, TOTAL (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
AUG , 1982					
18...	1430	<.01	.01	<.01	<.01

04102392 PAW PAW RIVER AT LAWRENCE, MI

LOCATION.--Lat 42°13'26", long 86°03'06", in NE¼ sec.9, T.3 S., R.15 W., Van Buren County, Hydrologic Unit 04050001, at bridge at 52nd St., in Lawrence.

DRAINAGE AREA.--265 mi² (686 km²).

PERIOD OF RECORD.--April 1980 to August 1982 (discontinued).

REMARKS.--Water-quality and sediment samples were collected once a month and during high flow for analysis. Discharge measurements were made at time of sampling. All data for period of record is published in this report.

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
APR , 1980										
24...	0950	377	422	--	13.0	--	--	--	--	--
MAY										
09...	1130	261	439	--	12.5	--	--	--	--	--
JUN										
05...	1320	469	394	--	17.0	--	--	--	.50	--
JUL										
09...	1615	346	421	7.8	22.0	6.6	76	--	.64	--
AUG										
06...	1220	528	383	7.7	20.0	6.2	70	--	.39	--
SEP										
04...	1000	356	415	7.8	19.0	7.1	76	--	.47	--
OCT										
15...	1615	240	467	--	9.5	--	--	--	.61	--
DEC										
04...	0930	327	441	7.2	.5	12.1	82	--	.71	--
JAN , 1981										
09...	1300	310	496	7.3	.0	12.0	81	1.1	.87	.85
FEB										
04...	1430	293	450	7.3	.0	11.3	75	--	.94	--
19...	1600	1300	278	7.4	1.0	12.2	85	--	1.1	--
21...	1600	1280	306	7.6	2.5	12.1	87	1.5	1.2	1.20
MAR										
04...	0930	469	360	7.6	5.0	12.6	97	1.3	1.0	.89
APR										
07...	1530	319	440	7.9	10.5	10.4	92	--	.63	--
MAY										
12...	2130	1420	260	7.6	10.5	10.1	88	--	.40	--
14...	1630	--	--	--	--	--	--	--	--	--
16...	1230	648	--	--	--	--	--	--	--	--
JUN										
10...	1445	292	430	7.9	20.0	7.2	78	--	.66	--
JUL										
08...	1545	204	420	8.0	23.5	6.9	79	--	.67	--
AUG										
05...	1345	197	410	8.1	21.0	7.8	86	.94	.54	.57
SEP										
16...	1215	170	422	8.1	16.5	8.7	88	--	.64	--
OCT										
28...	1715	337	420	7.9	9.0	9.0	78	1.0	.63	.61
NOV										
18...	0945	228	440	8.1	7.0	10.4	85	--	.77	--
DEC										
09...	1515	304	420	8.1	3.0	--	--	--	.88	--
JAN , 1982										
20...	1445	292	440	7.2	.0	9.6	65	--	.94	--
FEB										
18...	0915	346	405	7.6	2.0	12.3	88	--	.85	--
MAR										
10...	1030	276	425	8.0	2.0	12.3	87	1.2	.92	.89
17...	1120	2000	200	7.4	1.0	11.5	80	--	1.2	--
APR										
21...	0945	463	400	8.1	11.0	10.2	90	--	.51	--
MAY										
12...	1745	292	420	8.3	22.0	8.3	94	--	.59	--
JUN										
16...	0915	266	410	8.0	17.5	7.4	82	1.1	.78	.79
JUL										
22...	1625	687	350	7.7	23.0	5.6	64	--	.42	--
AUG										
11...	1415	200	430	8.1	18.5	8.5	89	--	--	--
18...	1630	175	370	8.1	21.0	8.1	88	--	--	--

041023+2 PAW PAW RIVER AT LAWRENCE, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
MAY									
09...	--	--	--	--	--	--	--	--	--
JUN									
05...	.010	--	.51	--	.050	--	.61	--	.66
JUL									
09...	.040	--	.68	--	.000	--	.53	--	.53
AUG									
06...	.010	--	.40	--	.000	--	.28	--	.28
SEP									
04...	.010	--	.48	--	.030	--	.32	--	.35
OCT									
15...	.010	--	.62	--	.100	--	.15	--	.25
DEC									
04...	.010	--	.72	--	.000	--	.25	--	.25
JAN , 1981									
09...	.030	.020	.90	.87	.020	.010	.30	.24	.32
FEB									
04...	.010	--	.95	--	.080	--	.36	--	.44
19...	.030	--	1.1	--	.110	--	.50	--	.61
21...	.020	.020	1.2	1.2	.060	.070	.56	.21	.62
MAR									
04...	<.010	.010	1.0	.90	.100	.040	.37	.31	.47
APR									
07...	.010	--	.64	--	.050	--	.51	--	.56
MAY									
12...	.020	--	.42	--	.040	--	.84	--	.88
14...	--	--	--	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--	--
JUN									
10...	<.010	--	.66	--	.080	--	.42	--	.50
JUL									
08...	.020	--	.69	--	.020	--	.52	--	.54
AUG									
05...	<.010	<.010	.54	.57	.020	.030	.25	.34	.27
SEP									
16...	.010	--	.65	--	.040	--	.66	--	.70
OCT									
28...	.010	.010	.64	.62	.050	.030	.48	.37	.53
NOV									
18...	.010	--	.78	--	.030	--	.28	--	.31
DEC									
09...	.010	.010	.89	.88	.060	.060	--	--	<.10
JAN , 1982									
20...	.030	--	.97	--	.090	--	.40	--	.49
FEB									
18...	.020	--	.87	--	.080	--	.25	--	.33
MAR									
10...	.010	<.010	.93	.89	.110	.100	.31	.22	.42
17...	.030	--	1.2	--	.100	--	.53	--	.63
APR									
21...	<.010	--	.51	--	<.010	--	--	--	.25
MAY									
12...	.020	--	.61	--	.040	--	.43	--	.47
JUN									
16...	.020	.030	.80	.82	.030	.020	.47	.28	.50
JUL									
22...	.020	--	.44	--	.040	--	.56	--	.60
AUG									
11...	--	--	--	--	--	--	--	--	--
18...	--	--	--	--	--	--	--	--	--

WATER-QUALITY DATA

DATE	NITROGEN,NH4 + ORG, SUSP, TOTAL (MG/L AS N)	NITROGEN,AMMONIA + ORGANIC DIS, (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
APR , 1980									
24...	--	--	--	--	--	--	--	12	12
MAY									
09...	--	--	--	--	--	--	--	10	7.0
JUN									
05...	--	--	1.2	.080	--	.040	--	20	25
JUL									
09...	--	--	1.2	.060	--	.090	--	35	33
AUG									
06...	--	--	.68	.060	--	.010	--	13	19
SEP									
04...	--	--	.83	.060	--	.020	--	15	14
OCT									
15...	--	--	.87	.030	--	.030	--	3	1.9
DEC									
04...	--	--	.97	.030	--	.010	--	6	5.3
JAN , 1981									
09...	--	.25	1.2	.020	<.010	.010	.000	2	1.7
FEB									
04...	--	--	1.4	.050	--	.020	--	9	7.1
19...	--	--	1.7	.080	--	.060	--	50	175
21...	--	.28	1.8	.050	.030	.020	.020	19	66
MAR									
04...	.12	.35	1.5	.030	<.010	.010	<.010	7	8.9
APR									
07...	--	--	1.2	.030	--	.010	--	5	4.3
MAY									
12...	--	--	1.3	.060	--	.010	--	13	50
14...	--	--	--	--	--	--	--	10	--
16...	--	--	--	--	--	--	--	10	17
JUN									
10...	--	--	1.2	.030	--	.020	--	33	26
JUL									
08...	--	--	1.2	<.010	--	<.010	--	21	12
AUG									
05...	.00	.37	.81	.050	.010	<.010	.020	14	7.4
SEP									
16...	--	--	1.4	.030	--	<.010	--	7	3.2
OCT									
28...	--	.40	1.2	.020	.020	.010	<.010	2	1.8
NOV									
18...	--	--	1.1	.020	--	<.010	--	10	6.2
DEC									
09...	--	<.10	--	.020	<.010	.020	.020	3	2.5
JAN , 1982									
20...	--	--	1.5	.020	--	.010	--	5	3.9
FEB									
18...	--	--	1.2	.020	--	.020	--	8	7.5
MAR									
10...	.10	.32	1.4	.030	.010	.020	<.010	5	3.7
17...	--	--	1.8	.070	--	.040	--	20	108
APR									
21...	--	--	.76	.030	--	<.010	--	35	44
MAY									
12...	--	--	1.1	.040	--	.010	--	10	7.9
JUN									
16...	.20	.30	1.3	.060	.030	.020	.020	25	18
JUL									
22...	--	--	1.0	.070	--	.050	--	6	11
AUG									
11...	--	--	--	--	--	--	--	11	5.9
18...	--	--	--	--	--	--	--	--	--

WATER-QUALITY DATA

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)
MAY , 1981											
12...	2130	4.9	38	140	9.0	37	13	5.3	.2	7	1.6
AUG , 1982											
18...	1630	3.9	15	210	27	53	20	8.1	.3	8	.8

DATE	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)
MAY , 1981											
12...	130	22	8.6	.1	6.4	1.2	183	170	.25	702	--
AUG , 1982											
18...	188	28	11	.2	9.1	--	250	243	.34	118	80

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BORON, TOTAL RECOVERABLE (UG/L AS B)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)
MAY , 1981											
12...	0	--	--	5	10	1	7	700	--	2	<4
AUG , 1982											
18...	3	100	90	--	10	1	4	330	17	2	--

DATE	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
MAY , 1981										
12...	40	--	<.1	7	0	70	60	30	--	--
AUG , 1982										
18...	50	19	--	2	--	130	--	40	<.01	<1

DATE	TIME	SILVEX, TOTAL (UG/L)	2,4-D, TOTAL (UG/L)	2,4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
AUG , 1982					
18...	1630	<.01	.01	<.01	<.01

04102420 PAW PAW RIVER NEAR HARTFORD, MI

LOCATION.--Lat 42°13'01", long 86°12'02", in SE¼ SW¼ sec.8, T.3 S., R.16 W., Van Buren County, Hydrologic Unit 04050001, on upstream rail of 6750th Street bridge, 1.3 mi (2.1 km) northwest of Hartford, and 0.3 mi (0.5 km) upstream from Pine Creek.

DRAINAGE AREA.--311 mi² (805 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1980 to September 1982 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 625 ft (190 m), from topographic map.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Occasional regulation by dams above station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,500 ft³/s (70.8 m³/s) Mar. 17, 1982, gage height, 10.37 ft (3.161 m); minimum, 202 ft³/s (5.72 m³/s) Sept. 8, 13, 14, 15, 1982; minimum gage height, 3.65 ft (1.113 m) Aug. 22, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,500 ft³/s (70.8 m³/s) Mar. 17, gage height, 10.37 ft (3.161 m); minimum, 202 ft³/s (5.72 m³/s) Sept. 8, 13, 14, 15; minimum gage height, 3.91 ft (1.192 m) Sept. 7, 8.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	616	352	564	320	380	366	724	363	605	312	270	216
2	519	346	582	330	370	359	714	363	626	292	271	214
3	479	341	566	340	370	351	784	356	596	292	274	213
4	491	346	533	370	360	347	861	346	557	308	283	216
5	531	366	507	430	350	334	862	337	530	320	292	214
6	513	381	474	500	350	341	831	332	480	303	274	208
7	451	376	432	549	340	363	797	335	418	291	257	204
8	391	368	407	520	340	329	754	341	379	294	281	204
9	361	361	395	480	340	320	721	340	361	280	296	210
10	345	353	385	460	340	313	721	336	350	261	280	212
11	330	345	374	450	340	345	718	326	334	349	250	210
12	319	338	360	430	340	430	720	317	325	334	249	205
13	311	332	345	420	350	866	726	310	323	343	251	202
14	304	327	337	410	350	1130	731	297	314	536	244	202
15	306	324	334	390	350	1140	733	291	300	610	241	208
16	310	321	331	380	360	1970	723	307	301	493	238	211
17	315	319	326	370	380	2360	704	301	308	648	236	215
18	348	312	301	370	400	2030	651	292	314	798	232	234
19	388	281	298	360	396	1790	598	292	323	809	227	242
20	401	369	321	360	391	1610	562	292	323	1070	226	249
21	409	492	377	360	398	1400	541	301	342	1120	225	245
22	449	495	335	360	416	1260	518	404	345	950	229	236
23	464	477	329	360	420	1230	493	451	343	794	230	231
24	468	464	330	360	424	1150	463	471	333	654	219	224
25	465	454	318	370	419	1050	439	460	304	512	221	228
26	458	475	305	370	401	967	421	473	291	419	227	231
27	447	613	315	370	381	897	407	512	289	353	226	230
28	427	597	316	380	372	846	393	541	301	316	225	231
29	398	579	314	380	---	790	383	499	346	304	228	231
30	371	554	320	380	---	736	367	501	344	292	217	230
31	359	---	320	380	---	746	---	536	---	279	217	---
TOTAL	12742	12058	11751	12309	10428	28146	19059	11623	11305	14936	7628	6606
MEAN	411	402	379	397	372	909	635	375	377	482	246	220
MAX	616	613	582	549	424	2360	862	541	626	1120	296	249
MIN	304	281	298	320	340	313	367	291	289	261	217	202
CFSM	1.32	1.29	1.22	1.28	1.20	2.92	2.04	1.21	1.21	1.55	.79	.71
IN.	1.52	1.44	1.41	1.47	1.25	3.37	2.28	1.39	1.35	1.79	.91	.79

CAL YR 1981 TOTAL 150541 MEAN 412 MAX 1720 MIN 227 CFSM 1.33 IN 18.01
WTR YR 1982 TOTAL 158611 MEAN 435 MAX 2360 MIN 202 CFSM 1.40 IN 18.97

04102420 PAW PAW RIVER NEAR HARTFORD, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--April 1980 to August 1982 (discontinued).

PERIOD OF DAILY RECORD.--
SUSPENDED-SEDIMENT DISCHARGE: July 1980 to August 1982.

REMARKS.--Sediment samples were collected on an approximate daily basis by a local observer. Water-quality samples were collected about once a month.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SEDIMENT CONCENTRATIONS: Maximum daily mean, 188 mg/L May 12, 1981; minimum daily mean, 1 mg/L on many days each year.
SEDIMENT LOADS: Maximum daily, 659 tons (598 tonnes) Feb. 21, 1981; minimum daily, 0.69 tons (0.63 tonnes) Nov. 21, 22, 1980.

EXTREMES FOR CURRENT YEAR.--
SEDIMENT CONCENTRATIONS: Maximum daily mean, 118 mg/L Oct. 1; minimum daily mean, 1 mg/L Nov. 17, Apr. 15, 17, May 23, July 5.
SEDIMENT LOADS: Maximum daily, 624 tons (566 tonnes) Mar. 17; minimum daily, 0.86 tons (0.78 tonnes) Nov. 17, July 5.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
OCT										
02...	1830	513	395	--	--	--	--	1.3	.75	.73
03...	1050	482	420	--	--	--	--	1.6	.61	.59
05...	0745	533	440	--	--	--	--	1.6	.59	.58
05...	1715	533	420	--	--	--	--	1.8	.58	.61
13...	1400	309	460	7.8	12.0	--	--	--	--	--
29...	1500	369	450	7.9	9.0	9.8	84	.97	.63	.62
NOV										
18...	1300	309	450	8.3	7.5	11.0	90	--	.80	--
24...	1045	463	--	--	--	--	--	--	--	--
DEC										
10...	0900	385	420	8.2	2.0	12.6	89	.95	.87	--
JAN										
21...	0945	360	360	7.8	.0	8.8	59	--	.90	--
FEB										
18...	1200	407	410	7.3	1.5	12.5	88	--	.81	--
MAR										
10...	1200	325	425	7.9	2.0	12.4	88	1.3	.88	.90
13...	1215	884	290	7.8	3.0	11.7	86	--	1.1	--
14...	1400	1050	225	7.6	1.5	11.8	82	--	1.3	--
15...	1415	1100	235	7.6	2.0	11.4	81	--	1.1	--
17...	1315	2330	220	7.4	1.0	12.1	84	1.6	1.3	1.20
25...	1250	1050	--	--	6.5	--	--	--	--	--
APR										
21...	1215	534	400	8.1	12.0	10.2	92	--	.49	--
MAY										
12...	1545	317	440	8.8	20.0	9.2	102	--	.60	--
JUN										
16...	1030	290	420	8.4	17.5	7.0	74	1.1	.78	.82
JUL										
22...	1930	909	325	7.7	23.0	5.7	66	--	.36	--
AUG										
11...	1015	247	456	7.7	18.0	8.1	87	--	--	--
19...	1100	227	390	8.2	20.5	8.4	91	--	--	--

04102420 PAW PAW RIVER NEAR HARTFORD, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)
OCT									
02...	.010	.010	.76	.74	.050	.040	.95	.54	1.00
03...	.010	.010	.62	.60	.060	.040	.76	.93	.82
05...	<.010	<.010	.59	.58	.050	.060	1.1	.94	1.10
05...	.010	<.010	.59	.61	.040	.030	.93	1.2	.97
13...	--	--	--	--	--	--	--	--	--
29...	<.010	<.010	.63	.62	.020	.020	.30	.33	.32
NOV									
18...	<.010	--	.80	--	.040	--	.47	--	.51
24...	--	--	--	--	--	--	--	--	--
DEC									
10...	.010	.020	.88	.84	.070	.070	.31	.04	.38
JAN									
21...	.030	--	.93	--	.130	--	.48	--	.61
FEB									
18...	.010	--	.82	--	.080	--	.21	--	.29
MAR									
10...	<.010	.010	.88	.91	.120	.110	.20	.23	.32
13...	.020	--	1.1	--	.140	--	.42	--	.56
14...	.020	--	1.3	--	.150	--	.47	--	.62
15...	.020	--	1.1	--	.100	--	.43	--	.53
17...	.020	.020	1.3	1.2	.090	.070	.59	.33	.68
25...	--	--	--	--	--	--	--	--	--
APR									
21...	.010	--	.50	--	.020	--	.28	--	.30
MAY									
12...	.020	--	.62	--	.030	--	1.5	--	1.50
JUN									
16...	.020	.020	.80	.84	.030	.010	.57	.29	.60
JUL									
22...	.020	--	.38	--	.050	--	.65	--	.70
AUG									
11...	--	--	--	--	--	--	--	--	--
19...	--	--	--	--	--	--	--	--	--

DATE	NITRO-GEN, NH4 + ORG, SUSP, TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC DIS, (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)
OCT									
02...	--	.58	1.8	<.010	<.010	.030	.050	16	22
03...	--	.97	1.4	.010	<.010	.030	.030	13	17
05...	--	1.0	1.7	<.010	<.010	.020	.030	16	23
05...	--	1.2	1.6	.050	.040	.020	.020	10	14
13...	--	--	--	--	--	--	--	5	4.2
29...	--	.35	.95	.030	.020	.010	<.010	3	3.0
NOV									
18...	--	--	1.3	.020	--	<.010	--	4	3.3
24...	--	--	--	--	--	--	--	5	6.3
DEC									
10...	--	.11	1.3	.030	.010	.060	.050	5	5.2
JAN									
21...	--	--	1.5	.030	--	.010	--	--	--
FEB									
18...	--	--	1.1	.030	--	.020	--	9	9.9
MAR									
10...	.00	.34	1.2	.050	.010	.020	<.010	7	6.1
13...	--	--	1.7	.080	--	.040	--	41	98
14...	--	--	1.9	.100	--	.060	--	24	68
15...	--	--	1.6	.070	--	.040	--	21	62
17...	.28	.40	2.0	.070	.040	.040	.020	98	617
25...	--	--	--	--	--	--	--	4	11
APR									
21...	--	--	.80	.030	--	.010	--	8	12
MAY									
12...	--	--	2.1	.040	--	.020	--	8	6.8
JUN									
16...	.30	.30	1.4	.060	.020	.030	.020	23	18
JUL									
22...	--	--	1.1	.060	--	.040	--	7	17
AUG									
11...	--	--	--	--	--	--	--	12	8.0
19...	--	--	--	--	--	--	--	10	6.1

04102420 PAW PAW RIVER NEAR HARTFORD, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM
AUG 19...	1100	4.2	17	220	30	55	21	8.8	.3	8

DATE	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)
AUG 19...	.9	194	29	12	.2	9.2	264	253	.36

DATE	SOLIDS, DISSOLVED (TONS PER DAY)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BORON, TOTAL RECOVERABLE (UG/L AS B)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)
AUG 19...	162	100	3	100	90	10	2	6	350

DATE	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
AUG 19...	<3	1	50	18	2	130	50	<.01	<1

DATE	TIME	SILVEX, TOTAL (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
AUG 19...	1100	<.01	<.01	<.01	<.01

04102420 PAW PAW RIVER NEAR HARTFORD, MI--CONTINUED

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	OCTOBER MEAN CONCEN-TRATION (MG/L)	OCTOBER LOADS (T/DAY)	NOVEMBER MEAN CONCEN-TRATION (MG/L)	NOVEMBER LOADS (T/DAY)	DECEMBER MEAN CONCEN-TRATION (MG/L)	DECEMBER LOADS (T/DAY)	JANUARY MEAN CONCEN-TRATION (MG/L)	JANUARY LOADS (T/DAY)	FEBRUARY MEAN CONCEN-TRATION (MG/L)	FEBRUARY LOADS (T/DAY)	MARCH MEAN CONCEN-TRATION (MG/L)	MARCH LOADS (T/DAY)
1	118	196	2	1.9	9	14	6	5.2	91	93	7	6.9
2	11	15	2	1.9	5	7.9	6	5.3	7	7.0	10	9.7
3	18	23	2	1.8	5	7.6	6	5.5	8	8.0	18	17
4	23	30	3	2.8	10	14	27	27	20	19	8	7.5
5	18	26	4	4.0	8	11	21	24	12	11	7	6.3
6	16	22	7	7.2	10	13	42	57	12	11	6	5.5
7	11	13	2	2.0	13	15	13	19	3	2.8	12	12
8	7	7.4	2	2.0	6	6.6	84	118	11	10	10	8.9
9	6	5.8	2	1.9	6	6.4	16	21	6	5.5	9	7.8
10	7	6.5	2	1.9	7	7.3	16	20	7	6.4	7	5.9
11	9	8.0	3	2.8	5	5.0	30	36	10	9.2	13	12
12	8	6.9	3	2.7	5	4.9	50	58	6	5.5	13	15
13	8	6.7	2	1.8	7	6.5	80	91	10	9.5	41	96
14	5	4.1	3	2.6	22	20	15	17	6	5.7	24	73
15	7	5.8	8	7.0	6	5.4	71	75	6	5.7	21	65
16	7	5.9	8	7.9	5	4.5	10	10	9	8.7	50	266
17	7	6.0	1	.86	5	4.4	2	2.0	23	24	98	624
18	8	7.5	8	6.7	6	4.9	15	15	16	17	50	274
19	8	8.4	6	4.6	9	7.2	22	21	16	17	39	188
20	9	9.7	10	10	11	9.5	46	45	15	16	10	43
21	10	11	4	5.3	8	8.1	7	6.8	15	16	12	45
22	11	13	4	5.3	7	6.3	6	5.8	15	17	15	51
23	12	15	6	7.7	7	6.2	6	5.8	13	15	12	40
24	12	15	5	6.3	6	5.3	6	5.8	15	17	11	34
25	12	15	6	7.4	6	5.2	12	12	14	16	24	68
26	10	12	5	6.4	5	4.1	12	12	12	13	6	16
27	8	9.7	33	55	5	4.3	6	6.0	12	12	6	15
28	5	5.8	8	13	31	26	11	11	12	12	7	16
29	3	3.2	10	18	6	5.1	7	7.2	---	---	5	11
30	3	3.0	11	16	5	4.3	3	3.1	---	---	4	7.9
31	3	2.9	---	---	7	6.0	3	3.1	---	---	14	28
TOTAL	---	519.3	---	211.76	---	256.0	---	750.6	---	410.0	---	2075.4

DAY	APRIL MEAN CONCEN-TRATION (MG/L)	APRIL LOADS (T/DAY)	MAY MEAN CONCEN-TRATION (MG/L)	MAY LOADS (T/DAY)	JUNE MEAN CONCEN-TRATION (MG/L)	JUNE LOADS (T/DAY)	JULY MEAN CONCEN-TRATION (MG/L)	JULY LOADS (T/DAY)	AUGUST MEAN CONCEN-TRATION (MG/L)	AUGUST LOADS (T/DAY)	SEPTEMBER MEAN CONCEN-TRATION (MG/L)	SEPTEMBER LOADS (T/DAY)
1	14	27	17	17	21	34	42	35	21	15		
2	10	19	8	7.8	18	30	41	32	7	5.1		
3	8	17	9	8.7	15	24	18	14	17	13		
4	4	9.3	29	27	15	23	34	28	5	3.8		
5	9	21	14	13	22	31	1	.86	19	15		
6	10	22	22	20	25	32	6	4.9	14	10		
7	3	6.5	48	43	19	21	70	55	22	15		
8	4	8.1	34	31	19	19	26	21	15	11		
9	6	12	3	2.8	19	19	17	13	14	11		
10	5	9.7	5	4.5	19	18	39	27	6	4.5		
11	5	9.7	6	5.3	19	17	21	20	12	8.1		
12	32	62	8	6.8	31	27	31	28	17	11		
13	32	63	8	6.7	25	22	12	11	19	13		
14	24	47	8	6.4	20	17	98	142	21	14		
15	1	2.0	2	1.6	24	19	49	81	13	8.5		
16	27	53	9	7.5	23	19	99	132	---	---		
17	1	1.9	11	8.9	22	18	34	59	---	---		
18	12	21	4	3.2	25	21	28	60	---	---		
19	4	6.5	10	7.9	33	29	3	6.6	---	---		
20	6	9.1	2	1.6	111	97	4	12	---	---		
21	8	12	10	8.1	60	55	5	15	---	---		
22	34	48	8	8.7	68	63	6	15	---	---		
23	9	12	1	1.2	74	69	8	17	---	---		
24	7	8.8	14	18	44	40	10	18	---	---		
25	12	14	12	15	53	44	12	17	---	---		
26	11	13	36	46	35	27	14	16	---	---		
27	10	11	36	50	6	4.7	14	13	---	---		
28	13	14	37	54	6	4.9	14	12	---	---		
29	8	8.3	27	36	50	47	16	13	---	---		
30	45	45	27	37	44	41	18	14	---	---		
31	---	---	26	38	---	---	20	15	---	---		
TOTAL	---	612.9	---	542.7	---	932.6	---	947.36	---			

04102500 PAW PAW RIVER AT RIVERSIDE, MI

LOCATION.--Lat 42°11'10", long 86°22'06", in SW¼ SE¼ sec.23, T.3 S., R.18 W., Berrien County, Hydrologic Unit 04050001, on left bank 40 ft (12 m) upstream from bridge on Coloma Road, 0.8 mi (1.3 km) east of Riverside.

DRAINAGE AREA.--390 mi² (1,010 km²).

PERIOD OF RECORD.--October 1951 to current year.

REVISED RECORDS.--WSP 1337: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 588.80 ft (179.466 m) National Geodetic Vertical Datum of 1929. May 10, 1966, to July 11, 1967, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation, principally during low flow, caused by paper mill above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--31 years, 442 ft³/s (12.52 m³/s), 15.39 in/yr (391 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,830 ft³/s (80.1 m³/s) Mar. 9, 1979; maximum gage height, 10.11 ft (3.082 m), Mar. 9, 1979, Mar. 18, 1982; minimum discharge, 99 ft³/s (2.80 m³/s) July 5, 1964, gage height, 2.66 ft (0.811 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,650 ft³/s (75.0 m³/s) Mar. 18, gage height, 10.11 ft (3.082 m); minimum, 274 ft³/s (7.76 m³/s) Sept. 8, gage height, 4.27 ft (1.301 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	678	439	568	376	460	489	937	520	581	388	387	290
2	775	429	572	377	450	484	881	507	610	361	379	287
3	687	419	579	383	450	475	880	498	624	350	376	288
4	611	410	581	436	440	467	910	486	617	362	373	288
5	575	405	577	525	430	438	912	474	606	371	381	293
6	568	409	570	586	420	433	944	462	595	372	385	290
7	565	411	556	568	410	436	941	457	574	354	361	283
8	542	409	536	554	410	448	925	457	530	342	387	276
9	494	404	520	540	410	440	908	451	478	341	432	277
10	445	400	506	520	410	432	903	445	443	327	407	286
11	412	395	489	510	410	468	902	437	421	385	374	289
12	387	389	475	500	410	517	890	428	397	454	338	286
13	366	384	462	500	410	749	882	414	385	414	336	280
14	357	378	447	490	410	1480	864	394	378	450	332	277
15	357	373	435	490	420	1430	843	382	368	650	323	295
16	384	370	426	490	430	1300	841	397	360	728	316	298
17	393	367	415	480	440	2220	848	394	357	696	310	296
18	410	363	408	480	466	2640	840	381	360	830	305	324
19	426	359	392	470	485	2500	815	384	375	833	298	338
20	439	398	383	470	524	2350	782	384	380	798	294	342
21	445	460	385	460	533	2210	746	371	382	928	293	368
22	454	513	377	460	541	1840	717	440	394	1120	291	353
23	466	515	392	460	546	1620	690	547	395	1040	302	325
24	473	495	398	450	552	1500	665	574	389	949	299	309
25	475	488	395	450	568	1380	641	550	377	863	290	296
26	476	494	388	450	533	1260	618	535	354	759	296	299
27	478	525	382	450	520	1150	594	538	343	652	301	299
28	478	563	383	450	503	1060	574	565	342	559	299	296
29	476	570	382	450	---	988	554	591	367	484	298	294
30	466	567	377	460	---	950	537	573	397	439	291	289
31	452	---	374	460	---	949	---	565	---	409	289	---
TOTAL	15010	13099	14130	14745	12971	35193	23985	14601	13179	18008	10343	9011
MEAN	484	437	456	476	463	1135	800	471	439	581	334	300
MAX	775	570	581	586	552	2640	944	591	624	1120	432	368
MIN	357	359	374	376	410	432	537	371	342	327	289	276
CFSM	1.24	1.12	1.17	1.22	1.19	2.91	2.05	1.21	1.13	1.49	.86	.77
IN.	1.43	1.25	1.35	1.41	1.24	3.36	2.29	1.39	1.26	1.72	.99	.86

CAL YR 1981 TOTAL 186830 MEAN 512 MAX 1860 MIN 261 CFSM 1.31 IN 17.82
WTR YR 1982 TOTAL 194275 MEAN 532 MAX 2640 MIN 276 CFSM 1.36 IN 18.53

04102540 BRANDYWINE CREEK NEAR COVERT, MI

LOCATION.--Lat 42°18'54", long 86°18'27", in NE¼ sec.8, T.2 S., R.17 W., Van Buren County, Hydrologic Unit 04050002, at bridge on old U.S. Highway 31, 2.7 mi (4.3 km) northwest of Covert.

DRAINAGE AREA.--16.7 mi² (43.3 km²).

PERIOD OF RECORD.--April 1980 to August 1982 (discontinued).

REMARKS.--Water-quality and sediment samples were collected once a month and during high flow for analysis. Discharge measurements were made at time of sampling. All data for period of record is published in this report.

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
APR , 1980										
24...	1030	12	210	--	7.0	--	--	--	--	--
MAY										
07...	1700	7.8	207	--	14.0	--	--	--	--	--
JUN										
06...	1230	107	144	--	16.5	--	--	--	.16	--
JUL										
11...	1400	6.7	336	7.6	18.5	7.6	82	--	.24	--
AUG										
08...	1330	14	222	7.2	20.0	7.5	82	--	.20	--
SEP										
05...	1515	7.5	229	7.4	18.0	8.3	86	--	.20	--
OCT										
14...	1700	6.2	220	--	9.0	--	--	--	.19	--
DEC										
08...	1250	100	357	7.1	7.0	10.4	84	--	.13	--
JAN , 1981										
14...	0900	11	230	6.5	.5	12.8	87	.61	.22	.26
FEB										
06...	1110	13	210	7.0	.0	12.2	82	--	.30	--
MAR										
05...	1415	21	170	7.1	4.0	13.6	102	.69	.28	.29
APR										
09...	1430	39	170	7.6	13.0	9.4	87	--	.19	--
MAY										
12...	1030	156	96	6.8	7.0	9.5	79	--	.15	--
15...	1140	--	--	--	--	--	--	--	--	--
JUN										
12...	1245	5.3	220	7.5	15.0	8.0	79	--	.26	--
JUL										
07...	1130	2.7	234	7.7	17.0	8.1	84	--	.30	--
AUG										
07...	1400	2.6	255	7.6	20.5	7.7	85	.50	.20	.20
SEP										
18...	1215	2.0	240	7.4	12.0	8.0	72	--	.19	--
OCT										
28...	1415	7.9	226	7.5	9.0	10.3	90	.50	.14	.14
NOV										
20...	1015	80	185	7.1	4.0	10.3	79	--	.35	--
DEC										
14...	1330	16	185	7.2	2.0	12.5	89	.96	.27	.25
JAN , 1982										
27...	1300	9.7	180	7.2	.5	11.1	75	--	.21	--
FEB										
19...	1515	18	180	7.1	2.0	12.7	91	--	.22	--
MAR										
11...	1445	37	170	7.2	2.0	12.4	89	.81	.44	.43
APR										
23...	1045	14	190	7.7	9.5	11.7	100	--	.15	--
MAY										
11...	1700	6.3	207	7.3	19.0	8.4	91	--	.16	--
JUN										
17...	1310	5.3	220	7.1	14.5	8.9	88	1.0	.18	.21
JUL										
23...	0940	7.8	245	7.7	19.0	7.2	77	--	.19	--
AUG										
11...	1545	3.0	244	7.3	18.0	8.4	90	--	--	--
23...	1200	2.1	220	8.2	17.0	7.6	79	--	--	--

WATER-QUALITY DATA

DATE	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NITRITE DISSOLVED (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
MAY									
07...	--	--	--	--	--	--	--	--	--
JUN									
06...	.000	--	.16	--	.020	--	.80	--	.82
JUL									
11...	.020	--	.26	--	.000	--	.53	--	.53
AUG									
08...	.020	--	.22	--	.050	--	1.2	--	1.20
SEP									
05...	.010	--	.21	--	.040	--	.60	--	.64
OCT									
14...	.020	--	.21	--	.100	--	.37	--	.47
DEC									
08...	.000	--	.13	--	.000	--	.59	--	.59
JAN , 1981									
14...	.020	.020	.24	.28	.110	.100	.41	.23	.52
FEB									
06...	.020	--	.32	--	.110	--	.19	--	.30
MAR									
05...	<.010	<.010	.28	.29	.160	.080	.48	.32	.64
APR									
09...	.010	--	.20	--	.070	--	.55	--	.62
MAY									
12...	<.010	--	.15	--	.050	--	.73	--	.78
15...	--	--	--	--	--	--	--	--	--
JUN									
12...	<.010	--	.26	--	.100	--	.59	--	.69
JUL									
07...	.030	--	.33	--	.020	--	.58	--	.60
AUG									
07...	.010	<.010	.21	.20	.040	.040	.48	.26	.52
SEP									
18...	<.010	--	.19	--	.070	--	.32	--	.39
OCT									
28...	<.010	<.010	.14	.14	.060	.050	.33	.31	.39
NOV									
20...	.010	--	.36	--	.060	--	.68	--	.74
DEC									
14...	<.010	<.010	.27	.25	.050	.050	2.3	.66	2.30
JAN , 1982									
27...	.010	--	.22	--	.090	--	.40	--	.49
FEB									
19...	.010	--	.23	--	.070	--	.44	--	.51
MAR									
11...	<.010	<.010	.44	.43	.100	.090	.39	.29	.49
APR									
23...	.010	--	.16	--	.110	--	.61	--	.72
MAY									
11...	.030	--	.19	--	.060	--	.92	--	.98
JUN									
17...	.020	.020	.20	.23	.060	.040	.64	.76	.70
JUL									
23...	<.010	--	.19	--	.080	--	.82	--	.90
AUG									
11...	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--

04102540 BRANDYWINE CREEK NEAR COVERT, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
APR , 1980									
24...	--	--	--	--	--	--	--	4	.13
MAY									
07...	--	--	--	--	--	--	--	3	.06
JUN									
06...	--	--	.98	.050	--	.010	--	129	37
JUL									
11...	--	--	.79	.020	--	.000	--	3	.05
AUG									
08...	--	--	1.4	.050	--	.000	--	6	.23
SEP									
05...	--	--	.85	.000	--	.010	--	3	.06
OCT									
14...	--	--	.68	.020	--	.020	--	2	.03
DEC									
08...	--	--	.72	.060	--	.000	--	215	58
JAN , 1981									
14...	--	.33	.76	.020	.010	<.010	<.010	6	.17
FEB									
06...	--	--	.62	.030	--	<.010	--	4	.14
MAR									
05...	.24	.40	.92	.010	<.010	.030	<.010	6	.34
APR									
09...	--	--	.82	.050	--	<.010	--	80	8.4
MAY									
12...	--	--	.93	.040	--	.020	--	--	--
15...	--	--	--	--	--	--	--	28	--
JUN									
12...	--	--	.95	.040	--	<.010	--	6	.09
JUL									
07...	--	--	.93	.030	--	<.010	--	6	.04
AUG									
07...	.22	.30	.73	.040	.020	.010	<.010	2	.01
SEP									
18...	--	--	.58	.020	--	<.010	--	2	.01
OCT									
28...	--	.36	.53	<.010	<.010	<.010	<.010	0	.00
NOV									
20...	--	--	1.1	.110	--	.020	--	104	22
DEC									
14...	--	.71	2.6	<.010	<.010	<.010	<.010	1	.04
JAN , 1982									
27...	--	--	.71	.020	--	<.010	--	1	.03
FEB									
19...	--	--	.74	.130	--	.040	--	21	1.0
MAR									
11...	.11	.38	.93	.020	.010	.020	<.010	167	17
APR									
23...	--	--	.88	.030	--	.020	--	6	.23
MAY									
11...	--	--	1.2	.030	--	.010	--	10	.17
JUN									
17...	.00	.80	.90	.040	.020	.020	<.010	5	.07
JUL									
23...	--	--	1.1	.040	--	.020	--	6	.13
AUG									
11...	--	--	--	--	--	--	--	9	.07
23...	--	--	--	--	--	--	--	7	.04

04102540 BRANDYWINE CREEK NEAR COVERT, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)
MAY , 1981											
12...	1030	7.0	60	44	13	12	3.5	3.6	.2	15	1.2
AUG , 1982											
23...	1200	3.0	65	95	15	26	7.3	12	.6	21	1.0

DATE	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)
MAY , 1981											
12...	31	8.4	5.1	<.1	4.7	.90	75	57	.10	31.6	--
AUG , 1982											
23...	80	11	21	<.1	9.0	--	139	136	.19	.79	90

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BORON, TOTAL RECOVERABLE (UG/L AS B)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)
MAY , 1981											
12...	0	--	--	1	20	1	2	730	--	1	<4
AUG , 1982											
23...	2	100	90	--	<10	1	7	1100	480	3	--

DATE	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
MAY , 1981										
12...	40	--	<.1	6	0	40	40	20	--	--
AUG , 1982										
23...	80	68	--	8	--	100	--	10	<.01	<1

04102540 BRANDYWINE CREEK NEAR COVERT, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	PCB, DIS-SOLVED (UG/L)	PCN DISSOLV (UG/L)	ALDRIN, DIS-SOLVED (UG/L)	AME-TRYNE TOTAL (UG/L)	ATRA-TONE TOTAL (UG/L)	ATRA-ZINE, TOTAL (UG/L)	CHLOR-DANE, DIS-SOLVED (UG/L)	CYAN-AZINE TOTAL (UG/L)	CYPRA-ZINE TOTAL (UG/L)
MAY , 1981										
12...	1030	<.1	<.10	<.01	<.10	<.10	<.10	<.10	<.10	<.10
AUG , 1982										
23...	1200	--	--	--	--	--	--	--	--	--

DATE	DDD, DIS-SOLVED (UG/L)	DDE, DIS-SOLVED (UG/L)	DDT, DIS-SOLVED (UG/L)	DI-AZINON, DIS-SOLVED (UG/L)	DI-ELDRIN DIS-SOLVED (UG/L)	ENDO-SULFAN DISSOLV (UG/L)	ENDRIN, DIS-SOLVED (UG/L)	ETHION DISSOLV (UG/L)	HEPTA-CHLOR, DIS-SOLVED (UG/L)	HEPTA-CHLOR EPOXIDE DIS-SOLVED (UG/L)
MAY , 1981										
12...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
AUG , 1982										
23...	--	--	--	--	--	--	--	--	--	--

DATE	LINDANE DIS-SOLVED (UG/L)	MALA-THION, DIS-SOLVED (UG/L)	METH-OXY-CHLOR DISSOLV (UG/L)	METHYL PARA-THION, DIS-SOLVED (UG/L)	METHYL-TRI-THION DISSOLV (UG/L)	MIREX, DIS-SOLVED (UG/L)	PARA-THION, DIS-SOLVED (UG/L)	PER-THANE DISSOLV (UG/L)	PROME-TONE TOTAL (UG/L)	PROME-TRYNE TOTAL (UG/L)
MAY , 1981										
12...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.1	.0
AUG , 1982										
23...	--	--	--	--	--	--	--	--	--	--

DATE	PRO-PAZINE TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	SIMA-ZINE TOTAL (UG/L)	SIME-TONE TOTAL (UG/L)	SIME-TRYNE TOTAL (UG/L)	TOX-APHENE, DIS-SOLVED (UG/L)	TRI-THION DISSOLV (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
MAY , 1981										
12...	<.10	<.01	.11	<.10	<.1	<1.0	<.01	<.01	<.01	<.01
AUG , 1982										
23...	--	<.01	--	--	--	--	--	.21	<.01	<.01

04102545 DEERLICK CREEK NEAR SOUTH HAVEN, MI

LOCATION.--Lat 42°22'23", long 86°17'07", in NE¼ sec.21, T.1 S., R.17 W., Van Buren County, Hydrologic Unit 04050002, at culvert at 76th St., 2.0 mi (3.2 km) south of South Haven.

DRAINAGE AREA.--7.76 mi² (20.1 km²).

PERIOD OF RECORD.--April 1980 to August 1982 (discontinued).

REMARKS.--Water-quality and sediment samples were collected once a month and during high flow for analysis. Discharge measurements were made at time of sampling. All data for period of record is published in this report.

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
APR , 1980										
24...	1200	3.5	375	--	8.0	--	--	--	--	--
MAY										
07...	1545	1.9	378	--	15.0	--	--	--	--	--
JUN										
06...	1110	83	211	--	16.0	--	--	--	.58	--
JUL										
11...	1300	.84	423	8.0	19.5	7.2	78	--	.43	--
AUG										
08...	1230	4.2	358	7.7	21.0	8.1	90	--	.68	--
SEP										
05...	1400	2.0	309	7.6	19.0	7.5	79	--	.49	--
OCT										
14...	1815	4.0	390	--	8.0	--	--	--	.63	--
DEC										
08...	1130	111	335	7.2	7.0	11.0	89	--	.40	--
JAN , 1981										
13...	1510	5.7	390	6.7	.0	11.5	78	.83	.59	.58
FEB										
06...	0945	6.4	360	7.0	.0	11.7	79	--	.71	--
MAR										
05...	1330	8.2	330	7.3	3.0	12.8	93	.82	.58	.58
APR										
09...	1310	22	220	7.7	10.5	10.5	91	--	.29	--
MAY										
11...	1745	156	131	7.8	8.0	10.7	90	--	.35	--
15...	1120	--	--	--	--	--	--	--	--	--
JUN										
12...	1210	.51	480	7.1	16.0	8.4	84	--	.37	--
JUL										
06...	1900	.23	498	8.0	21.0	7.8	89	--	.48	--
AUG										
07...	1245	.24	510	7.7	20.5	5.6	62	--	.42	--
SEP										
18...	1200	E.04	1000	7.7	12.0	--	--	--	.53	--
OCT										
28...	1145	1.5	421	7.6	7.0	8.8	73	.63	.25	.25
NOV										
20...	0845	44	340	7.7	4.5	11.3	88	--	.70	--
DEC										
14...	1215	6.7	345	7.6	2.0	13.2	94	1.8	.68	.67
JAN , 1982										
27...	1045	3.1	310	7.0	.5	12.5	84	--	.50	--
FEB										
19...	1430	11	285	7.3	.5	12.9	88	--	.49	--
MAR										
11...	1330	42	265	7.5	.5	12.8	86	1.4	.92	.89
APR										
23...	0940	4.3	315	8.2	9.0	12.4	105	--	.27	--
MAY										
12...	1115	.90	414	7.7	17.0	7.9	82	--	.13	--
JUN										
17...	1215	.89	390	7.4	14.0	8.3	82	.83	.47	.51
JUL										
23...	1050	3.6	350	7.9	20.0	7.8	84	--	1.2	--
AUG										
11...	1430	.13	522	7.4	18.0	8.0	86	--	--	--

04102545 OFERLICK CREEK NEAR SOUTH HAVEN, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
MAY									
07...	--	--	--	--	--	--	--	--	--
JUN									
06...	.010	--	.59	--	.040	--	.95	--	.99
JUL									
11...	.020	--	.45	--	.000	--	.34	--	.34
AUG									
08...	.010	--	.69	--	.020	--	.40	--	.42
SEP									
05...	.010	--	.50	--	.010	--	.56	--	.57
OCT									
14...	.010	--	.64	--	.060	--	.32	--	.38
DEC									
08...	.000	--	.40	--	.010	--	--	--	--
JAN , 1981									
13...	.030	<.010	.62	.58	.100	.110	.30	.14	.40
FEB									
06...	.020	--	.73	--	.080	--	.55	--	.63
MAR									
05...	<.010	<.010	.58	.58	.110	.080	.22	.16	.33
APR									
09...	.020	--	.31	--	.080	--	.46	--	.54
MAY									
11...	.010	--	.36	--	.130	--	.97	--	1.10
15...	--	--	--	--	--	--	--	--	--
JUN									
12...	<.010	--	.37	--	.080	--	.49	--	.57
JUL									
06...	.020	--	.50	--	.050	--	.58	--	.63
AUG									
07...	.020	--	.44	--	.030	--	.45	--	.48
SEP									
18...	.050	--	.58	--	.920	--	.68	--	1.60
OCT									
28...	<.010	<.010	.25	.25	.030	.070	.42	.31	.45
NOV									
20...	.020	--	.72	--	.080	--	.78	--	.86
DEC									
14...	<.010	<.010	.68	.67	.040	.040	.96	1.1	1.00
JAN , 1982									
27...	.020	--	.52	--	.080	--	.48	--	.56
FEB									
19...	.010	--	.50	--	.080	--	.45	--	.53
MAR									
11...	.020	.010	.94	.90	.130	.140	.47	.33	.60
APR									
23...	<.010	--	.27	--	.050	--	.64	--	.69
MAY									
12...	.020	--	.15	--	.050	--	.95	--	1.00
JUN									
17...	.030	.020	.50	.53	.050	.040	.45	.26	.50
JUL									
23...	.020	--	1.2	--	.070	--	.63	--	.70
AUG									
11...	--	--	--	--	--	--	--	--	--

04102545 DEERLICK CREEK NEAR SOUTH HAVEN, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN,NH4 + ORG, SUSP, TOTAL (MG/L AS N)	NITROGEN,AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
APR , 1980									
24...	--	--	--	--	--	--	--	5	.05
MAY									
07...	--	--	--	--	--	--	--	3	.02
JUN									
06...	--	--	1.6	.280	--	.060	--	192	43
JUL									
11...	--	--	.79	.030	--	.000	--	13	.03
AUG									
08...	--	--	1.1	.050	--	.000	--	16	.18
SEP									
05...	--	--	1.1	.020	--	.010	--	10	.05
OCT									
14...	--	--	1.0	.020	--	.000	--	4	.04
DEC									
08...	--	--	--	.120	--	.000	--	370	111
JAN , 1981									
13...	--	.25	1.0	.020	.020	<.010	<.010	6	.09
FEB									
06...	--	--	1.4	.110	--	<.010	--	4	.07
MAR									
05...	.09	.24	.91	.020	<.010	.020	.010	5	.11
APR									
09...	--	--	.85	.060	--	.020	--	66	3.9
MAY									
11...	--	--	1.5	.100	--	.040	--	--	--
15...	--	--	--	--	--	--	--	11	--
JUN									
12...	--	--	.94	.040	--	<.010	--	8	.01
JUL									
06...	--	--	1.1	.040	--	.020	--	22	.01
AUG									
07...	--	--	.92	.060	--	.020	.020	20	.01
SEP									
18...	--	--	2.2	.120	--	.070	--	6	.00
OCT									
28...	--	.38	.70	.010	<.010	<.010	<.010	3	.01
NOV									
20...	--	--	1.6	.140	--	.060	--	130	15
DEC									
14...	--	1.1	1.7	.010	--	<.010	--	2	.04
JAN , 1982									
27...	--	--	1.1	.020	--	<.010	--	3	.03
FEB									
19...	--	--	1.0	.090	--	.020	--	17	.51
MAR									
11...	.13	.47	1.5	.100	.030	.030	.020	229	26
APR									
23...	--	--	.96	.020	--	.020	--	9	.10
MAY									
12...	--	--	1.2	.040	--	.020	--	5	.01
JUN									
17...	.20	.30	1.0	.050	.020	.020	<.010	11	.03
JUL									
23...	--	--	1.9	.040	--	.020	--	8	.08
AUG									
11...	--	--	--	--	--	--	--	5	.00

04102545 DEERLICK CREEK NEAR SOUTH HAVEN, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)
MAY , 1981												
11...	1745	84	60	53	10	14	4.4	4.1	.2	14	1.7	43

DATE	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ARSENIC TOTAL (UG/L AS AS)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)
MAY , 1981												
11...	9.8	6.3	<.1	3.4	1.3	85	70	.12	35.8	0	1	10

DATE	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)
MAY , 1981												
11...	1	7	3800	4	<4	140	<.1	9	0	50	40	50

DATE	TIME	AMETRYNE TOTAL	ATRATONE TOTAL (UG/L)	ATRAZINE, TOTAL (UG/L)	CYANAZINE TOTAL (UG/L)	CYPRAZINE TOTAL (UG/L)	PROMETONE TOTAL (UG/L)	PROMETRYNE TOTAL (UG/L)
MAY , 1981								
11...	1745	<.10	<.10	.20	<.10	<.10	<.1	.0
22...	0930	<.10	<.10	<.10	<.10	<.10	<.1	<.1

DATE	PROPAZINE TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	SIMAZINE TOTAL (UG/L)	SIMETONE TOTAL (UG/L)	SIMETRYNE TOTAL (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
MAY , 1981								
11...	<.10	<.01	3.9	<.10	<.1	.01	<.01	<.01
22...	<.10	<.01	<.10	<.10	<.1	<.01	<.01	<.01

04102575 BLACK RIVER DRAIN NEAR BANGOR, MI

LOCATION.--Lat 42°20'40", long 86°03'12", in NW¼ sec.34, T.1 S., R.15 W., Van Buren County, Hydrologic Unit 04050002, upstream from confluence of streams 125 ft (38.1 m) upstream from 52nd Road, 3.8 mi (6.1 km) northeast of Bangor.

DRAINAGE AREA.--23.6 mi² (61.1 km²).

PERIOD OF RECORD.--April 1980 to August 1982 (discontinued).

REMARKS.--Water-quality and sediment samples were collected once a month and during high flow for analysis. Discharge measurements were made at time of sampling. All data for period of record is published in this report.

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
APR , 1980										
24...	0945	26	397	--	9.5	--	--	--	--	--
MAY										
06...	0830	20	435	--	13.0	--	--	--	--	--
JUN										
09...	1100	332	344	--	16.0	--	--	--	.29	--
JUL										
10...	1200	18	429	7.8	18.5	7.4	80	--	.31	--
AUG										
07...	0800	23	393	7.8	19.5	6.7	73	--	.11	--
SEP										
04...	1430	30	396	7.7	19.0	7.0	74	--	.42	--
OCT										
14...	1400	14	401	--	9.0	--	--	--	.20	--
DEC										
04...	1400	36	427	6.8	2.0	11.8	84	--	.59	--
JAN , 1981										
12...	1340	23	450	7.1	.0	11.7	79	.61	.27	.27
FEB										
05...	0940	27	410	7.3	.0	14.2	95	--	.31	--
MAR										
04...	1300	44	300	7.3	5.5	10.6	83	1.0	.50	.48
APR										
08...	1110	19	440	7.9	10.0	9.7	87	--	.21	--
MAY										
12...	0900	381	250	7.4	9.0	--	--	--	.45	--
15...	0750	--	--	--	--	--	--	--	--	--
JUN										
11...	1145	16	440	7.7	16.5	8.3	84	--	.18	--
JUL										
06...	1600	11	543	7.7	17.5	7.2	87	--	.21	--
AUG										
06...	0745	9.1	490	7.9	15.5	9.0	87	.63	.17	.17
SEP										
17...	0845	9.6	480	8.1	11.5	8.8	80	--	.18	--
OCT										
01...	1150	41	--	--	--	--	--	--	--	--
28...	0915	19	456	8.0	8.0	8.4	72	.91	.26	.24
NOV										
18...	1445	13	480	8.3	9.0	11.5	98	--	--	--
DEC										
10...	1100	26	400	7.9	3.0	11.3	82	.73	.37	.37
JAN , 1982										
21...	1045	23	420	7.5	.0	11.2	75	--	.29	--
FEB										
18...	1345	25	370	7.5	3.0	10.9	80	--	.40	--
MAR										
10...	1350	20	420	7.7	4.0	9.8	73	.87	.33	.34
18...	1300	424	265	7.5	3.0	10.1	74	--	.74	--
APR										
21...	1400	33	385	8.0	11.5	10.2	91	--	.20	--
MAY										
11...	1500	14	455	8.2	20.0	9.8	109	--	.09	--
JUN										
16...	1210	14	450	7.6	14.5	7.5	73	.57	.18	.15
JUL										
20...	0930	272	300	7.5	22.0	3.5	39	--	.10	--
AUG										
10...	1430	12	464	8.5	16.0	8.2	85	--	--	--
19...	1315	9.9	440	8.2	16.0	8.3	82	--	--	--

04102575 BLACK RIVER DRAIN NEAR BANGOR, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NITRITE DISSOLVED (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
MAY									
06...	--	--	--	--	--	--	--	--	--
JUN									
09...	.020	--	.31	--	.000	--	.98	--	.98
JUL									
10...	.000	--	.31	--	.000	--	.46	--	.46
AUG									
07...	.000	--	.11	--	.010	--	.39	--	.40
SEP									
04...	.020	--	.44	--	.050	--	.25	--	.30
OCT									
14...	.010	--	.21	--	.060	--	.27	--	.33
DEC									
04...	.010	--	.60	--	.120	--	.29	--	.41
JAN , 1981									
12...	.010	.020	.28	.29	.120	.120	.34	.20	.46
FEB									
05...	.010	--	.32	--	.120	--	.42	--	.54
MAR									
04...	<.010	<.010	.50	.48	.090	.090	.40	.43	.49
APR									
08...	.010	--	.22	--	.080	--	.51	--	.59
MAY									
12...	.020	--	.47	--	.070	--	.88	--	.95
15...	--	--	--	--	--	--	--	--	--
JUN									
11...	.020	--	.20	--	.070	--	.33	--	.40
JUL									
06...	.020	--	.23	--	.040	--	.27	--	.31
AUG									
06...	.010	.010	.18	.18	--	.050	--	.40	--
SEP									
17...	.020	--	.20	--	.060	--	.31	--	.37
OCT									
01...	--	--	--	--	--	--	--	--	--
28...	.010	.010	.27	.25	.080	.120	1.1	.54	1.20
NOV									
18...	.010	--	<.01	--	.030	--	.41	--	.44
DEC									
10...	.020	.010	.39	.38	.120	.110	.35	.24	.47
JAN , 1982									
21...	.020	--	.31	--	.170	--	.59	--	.76
FEB									
18...	.010	--	.41	--	.130	--	2.0	--	2.10
MAR									
10...	.030	<.010	.36	.34	.240	.180	.64	.35	.88
18...	.020	--	.76	--	.060	--	.16	--	.22
APR									
21...	.010	--	.21	--	.050	--	.48	--	.53
MAY									
11...	.070	--	.16	--	.050	--	1.4	--	1.40
JUN									
16...	.020	.020	.20	.17	.100	.090	.30	.31	.40
JUL									
20...	.020	--	.12	--	.080	--	.92	--	1.00
AUG									
10...	--	--	--	--	--	--	--	--	--
19...	--	--	--	--	--	--	--	--	--

04102575 BLACK RIVER DRAIN NEAR BANGOR, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN,NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITROGEN,AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
MAY									
06...	--	--	--	--	--	--	--	17	--
JUN									
09...	--	--	1.3	.110	--	.040	--	40	36
JUL									
10...	--	--	.77	.040	--	.020	--	13	.63
AUG									
07...	--	--	.51	.040	--	.010	--	22	1.4
SEP									
04...	--	--	.74	.050	--	.010	--	11	.89
OCT									
14...	--	--	.54	.030	--	.010	--	4	.15
DEC									
04...	--	--	1.0	.040	--	.020	--	5	.49
JAN , 1981									
12...	--	.32	.74	.040	.020	<.010	<.010	6	.37
FEB									
05...	--	--	.86	.030	--	.010	--	9	.66
MAR									
04...	.00	.52	.99	.040	.020	.010	.010	8	.95
APR									
08...	--	--	.81	.070	--	.020	--	13	.67
MAY									
12...	--	--	1.4	.070	--	.020	--	25	26
15...	--	--	--	--	--	--	--	22	--
JUN									
11...	--	--	.60	.050	--	.040	--	15	.65
JUL									
06...	--	--	.54	.040	--	.010	--	25	.74
AUG									
06...	--	.45	--	--	.010	--	.020	27	.66
SEP									
17...	--	--	.57	.040	--	.020	--	21	.54
OCT									
01...	--	--	--	--	--	--	--	26	2.9
28...	--	.66	1.5	.030	.010	<.010	<.010	4	.21
NOV									
18...	--	--	.44	.020	--	<.010	--	6	.21
DEC									
10...	--	.35	.86	.030	.020	.050	.050	5	.35
JAN , 1982									
21...	--	--	1.1	.030	--	.010	--	9	.56
FEB									
18...	--	--	2.5	.030	--	.020	--	7	.47
MAR									
10...	.35	.53	1.2	.450	.010	.050	<.010	552	30
18...	--	--	.98	.050	--	.020	--	12	14
APR									
21...	--	--	.74	.040	--	.010	--	23	2.0
MAY									
11...	--	--	1.6	.040	--	.020	--	15	.57
JUN									
16...	.00	.40	.60	.040	.010	.020	<.010	20	.76
JUL									
20...	--	--	1.1	.080	--	.040	--	36	26
AUG									
10...	--	--	--	--	--	--	--	21	.68
19...	--	--	--	--	--	--	--	43	1.1

04102575 BLACK RIVER DRAIN NEAR BANGOR, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)
MAY , 1981											
12...	0900	7.6	60	120	9.0	31	10	6.6	.3	11	2.0
AUG , 1982											
19...	1315	17	16	250	4.0	59	24	15	.5	12	1.1

DATE	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)
MAY , 1981											
12...	110	10	13	.1	4.2	1.5	168	143	.23	173	--
AUG , 1982											
19...	242	17	17	.3	13	--	317	292	.43	8.5	240

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BORON, TOTAL RECOVERABLE (UG/L AS B)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)
MAY , 1981											
12...	1	--	--	1	10	2	7	700	--	5	<4
AUG , 1982											
19...	9	200	120	--	10	3	7	730	15	1	--

DATE	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
MAY , 1981										
12...	20	--	<.1	25	0	100	80	40	--	--
AUG , 1982										
19...	40	34	--	4	--	360	--	30	<.01	<1

04102575 BLACK RIVER DRAIN NEAR BANGOR, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	PCB, DIS-SOLVED (UG/L)	PCN DISSOLV (UG/L)	ALDRIN, DIS-SOLVED (UG/L)	AME-TRYNE TOTAL (UG/L)	ATRA-TONE TOTAL (UG/L)	ATRA-ZINE, TOTAL (UG/L)	CHLOR-DANE, DIS-SOLVED (UG/L)	CYAN-AZINE TOTAL (UG/L)	CYPRA-ZINE TOTAL (UG/L)
MAY , 1981										
11...	0900	<.1	<.10	<.01	--	--	--	<.10	--	--
22...	1100	--	--	--	<.10	<.10	.20	--	<.10	<.10
AUG , 1982										
19...	1315	--	--	--	--	--	--	--	--	--

DATE	DDD, DIS-SOLVED (UG/L)	DDE, DIS-SOLVED (UG/L)	DDT, DIS-SOLVED (UG/L)	DI-AZINON, DIS-SOLVED (UG/L)	DI-ELDRIN DIS-SOLVED (UG/L)	ENDO-SULFAN DISSOLV (UG/L)	ENDRIN, DIS-SOLVED (UG/L)	ETHION DISSOLV (UG/L)	HEPTA-CHLOR, DIS-SOLVED (UG/L)	HEPTA-CHLOR EPOXIDE DIS-SOLVED (UG/L)
MAY , 1981										
11...	<.01	<.01	<.01	.06	<.01	<.01	<.01	<.01	<.01	<.01
22...	--	--	--	--	--	--	--	--	--	--
AUG , 1982										
19...	--	--	--	--	--	--	--	--	--	--

DATE	LINDANE DIS-SOLVED (UG/L)	MALA-THION, DIS-SOLVED (UG/L)	METH-OXY-CHLOR DISSOLV (UG/L)	METHYL PARA-THION, DIS-SOLVED (UG/L)	METHYL-TRI-THION DISSOLV (UG/L)	MIREX, DIS-SOLVED (UG/L)	PARA-THION, DIS-SOLVED (UG/L)	PER-THANE DISSOLV (UG/L)	PROME-TONE TOTAL (UG/L)	PROME-TRYNE TOTAL (UG/L)
MAY , 1981										
11...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	--	--
22...	--	--	--	--	--	--	--	--	<.1	.0
AUG , 1982										
19...	--	--	--	--	--	--	--	--	--	--

DATE	PRO-PAZINE TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	SIMA-ZINE TOTAL (UG/L)	SIME-TONE TOTAL (UG/L)	SIME-TRYNE TOTAL (UG/L)	TOX-APHENE, DIS-SOLVED (UG/L)	TRI-THION DISSOLV (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
MAY , 1981										
11...	--	<.01	--	--	--	<1.0	<.01	.45	<.01	<.01
22...	<.10	--	.08	<.10	<.1	--	--	--	--	--
AUG , 1982										
19...	--	<.01	--	--	--	--	--	.01	<.01	<.01

04102590 HAVEN-MAX LAKE DRAIN NEAR BANGOR, MI

LOCATION.--Lat 42°20'50", long 86°03'10", in SW¼ sec.27, T.1 S., R.15 W., Van Buren County, Hydrologic Unit 04050002, at culvert on 20th Road, 4.0 mi (6.4 km) northeast of Bangor.

DRAINAGE AREA.--16.8 mi² (43.5 km²).

PERIOD OF RECORD.--April 1980 to August 1982 (discontinued).

REMARKS.--Water-quality and sediment samples were collected once a month and during high flow for analysis. Discharge measurements were made at time of sampling. All data for period of record is published in this report.

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
APR , 1980										
24...	1045	20	464	--	9.0	--	--	--	--	--
MAY										
06...	0950	11	520	--	14.5	--	--	--	--	--
JUN										
09...	1230	112	346	--	16.0	--	--	--	.14	--
JUL										
10...	1315	9.0	464	7.7	26.5	8.0	100	--	.06	--
AUG										
07...	0945	24	422	7.6	22.0	6.4	74	--	.02	--
SEP										
04...	1530	26	402	7.8	24.0	8.0	92	--	.05	--
OCT										
15...	0910	11	395	--	9.5	--	--	--	.02	--
DEC										
04...	1500	20	481	7.1	3.0	13.4	97	--	.06	--
JAN , 1981										
12...	1500	13	550	7.7	.0	13.2	89	.63	.14	.15
FEB										
05...	1025	19	480	7.3	.0	13.2	88	--	.19	--
MAR										
04...	1330	27	410	7.3	3.5	11.2	83	.75	.49	.48
APR										
08...	1225	13	490	8.1	13.5	11.4	108	--	.22	--
MAY										
13...	1205	E192	338	7.4	12.0	7.9	74	--	.16	--
15...	0830	51	--	--	--	--	--	--	--	--
JUN										
11...	1250	9.2	480	8.1	20.5	10.3	112	--	.04	--
JUL										
06...	1430	5.4	573	8.4	26.5	10.3	124	--	.02	--
AUG										
06...	0930	5.0	520	7.9	21.5	7.8	86	.35	.02	.02
SEP										
17...	1030	4.5	480	8.0	14.0	8.0	76	--	.04	--
OCT										
01...	1245	30	--	--	--	--	--	--	--	--
27...	1730	13	472	7.9	12.0	9.0	85	.81	.08	.10
NOV										
18...	1545	7.3	540	8.4	9.5	13.5	115	--	--	--
DEC										
10...	1215	14	440	7.7	3.0	12.2	89	.71	.16	.17
JAN , 1982										
21...	1130	18	460	7.1	.0	10.4	70	--	.45	--
FEB										
18...	1500	17	480	7.3	2.5	11.5	83	--	.42	--
MAR										
10...	1445	12	480	7.5	4.0	12.3	87	.86	.43	.42
APR										
21...	1500	19	425	8.3	13.0	14.2	131	--	.31	--
MAY										
11...	1630	8.0	480	8.6	25.0	10.7	130	--	--	--
JUN										
16...	1245	7.9	470	7.7	18.0	8.8	93	--	--	--
AUG										
10...	1230	5.2	470	8.6	20.5	8.9	100	--	--	--
19...	1500	3.3	460	8.6	24.0	12.3	146	--	--	--

04102590 HAVEN-HAX LAKE DRAIN NEAR BANGOR, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NITRITE DISSOLVED (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
MAY									
06...	--	--	--	--	--	--	--	--	--
JUN									
09...	.010	--	.15	--	.090	--	.77	--	.86
JUL									
10...	.040	--	.10	--	.030	--	.68	--	.71
AUG									
07...	.000	--	.02	--	.020	--	.58	--	.60
SEP									
04...	.010	--	.06	--	.040	--	.53	--	.57
OCT									
15...	.010	--	.03	--	.070	--	.59	--	.66
DEC									
04...	.010	--	.07	--	.060	--	.54	--	.60
JAN , 1981									
12...	<.010	.010	.14	.16	.100	.090	.67	.38	.77
FEB									
05...	.030	--	.22	--	.090	--	.45	--	.54
MAR									
04...	<.010	<.010	.49	.48	.060	.040	.33	.23	.39
APR									
08...	<.010	--	.22	--	.060	--	.60	--	.66
MAY									
13...	.010	--	.17	--	.030	--	.64	--	.67
15...	--	--	--	--	--	--	--	--	--
JUN									
11...	.010	--	.05	--	.060	--	.90	--	.96
JUL									
06...	<.010	--	.02	--	<.010	--	.46	--	.46
AUG									
06...	<.010	<.010	.02	.02	.050	.030	.68	.30	.73
SEP									
17...	<.010	--	.04	--	.050	--	.50	--	.55
OCT									
01...	--	--	--	--	--	--	--	--	--
27...	.020	.010	.10	.11	.130	.140	.49	.56	.62
NOV									
18...	.010	--	<.01	--	.070	--	.71	--	.78
DEC									
10...	.010	.010	.17	.18	.150	.150	.33	.38	.48
JAN , 1982									
21...	.020	--	.47	--	.140	--	1.5	--	1.60
FEB									
18...	.010	--	.43	--	.050	--	.60	--	.65
MAR									
10...	<.010	<.010	.43	.42	.060	.060	.51	.38	.57
APR									
21...	<.010	--	.31	--	<.010	--	--	--	.56
MAY									
11...	.020	--	<.10	--	.060	--	1.1	--	1.20
JUN									
16...	<.010	<.010	<.10	<.10	<.010	<.010	--	--	.70
AUG									
10...	--	--	--	--	--	--	--	--	--
19...	--	--	--	--	--	--	--	--	--

WATER-QUALITY DATA

DATE	NITROGEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
APR , 1980									
24...	--	--	--	--	--	--	--	41	2.2
MAY									
06...	--	--	--	--	--	--	--	33	.98
JUN									
09...	--	--	1.0	.060	--	.010	--	42	13
JUL									
10...	--	--	.81	.030	--	.010	--	19	.46
AUG									
07...	--	--	.62	.050	--	.010	--	53	3.4
SEP									
04...	--	--	.63	.040	--	.000	--	19	1.3
OCT									
15...	--	--	.69	.030	--	.000	--	16	.48
DEC									
04...	--	--	.67	.030	--	.040	--	10	.54
JAN , 1981									
12...	--	.47	.91	.060	.020	<.010	<.010	30	1.1
FEB									
05...	--	--	.76	.060	--	.030	--	13	.67
MAR									
04...	.12	.27	.88	.040	.020	.020	<.010	13	.95
APR									
08...	--	--	.88	.030	--	<.010	--	9	.32
MAY									
13...	--	--	.84	.040	--	<.010	--	26	--
15...	--	--	--	--	--	--	--	31	4.3
JUN									
11...	--	--	1.0	.030	--	.030	--	18	.45
JUL									
06...	--	--	.48	.030	--	<.010	--	4	.06
AUG									
06...	.40	.33	.75	.030	<.010	<.010	<.010	3	.04
SEP									
17...	--	--	.59	.030	--	.020	--	19	.23
OCT									
01...	--	--	--	--	--	--	--	35	2.8
27...	--	.70	.72	.040	.020	<.010	<.010	5	.18
NOV									
18...	--	--	.78	.030	--	<.010	--	3	.06
DEC									
10...	--	.53	.65	.030	<.010	.050	.050	7	.26
JAN , 1982									
21...	--	--	2.1	.040	--	.020	--	10	.49
FEB									
18...	--	--	1.1	.060	--	.030	--	7	.32
MAR									
10...	.13	.44	1.0	.040	.020	.030	<.010	7	.23
APR									
21...	--	--	.87	.040	--	.010	--	9	.46
MAY									
11...	--	--	--	.040	--	.020	--	9	.19
JUN									
16...	.20	.50	--	.030	.010	.010	<.010	2	.04
AUG									
10...	--	--	--	--	--	--	--	6	.08
19...	--	--	--	--	--	--	--	11	.10

04102590 HAVEN-HAX LAKE DRAIN NEAR BANGOR, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)
MAY , 1981											
13...	1205	1.7	32	160	8.0	42	14	13	.4	15	1.9
AUG , 1982											
19...	1500	3.2	25	190	35	46	19	33	1.1	27	1.9

DATE	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	ARSENIC TOTAL (UG/L AS AS)
MAY , 1981											
13...	150	9.5	24	.1	4.1	1.4	220	199	.30	--	0
AUG , 1982											
19...	158	17	72	.2	4.4	--	339	289	.46	110	3

DATE	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BORON, TOTAL RECOVERABLE (UG/L AS B)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)
MAY , 1981										
13...	--	--	1	20	1	6	700	--	7	<4
AUG , 1982										
19...	100	110	--	10	3	8	280	26	2	--

DATE	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
MAY , 1981										
13...	30	--	<.1	12	0	120	110	40	--	--
AUG , 1982										
19...	20	13	--	3	--	250	--	30	<.01	<1

04102590 HAVEN-MAX LAKE DRAIN NEAR BANGOR, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	PCB, DIS-SOLVED (UG/L)	PCN DISSOLV (UG/L)	ALDRIN, DIS-SOLVED (UG/L)	CHLOR-DANE, DIS-SOLVED (UG/L)	DDD, DIS-SOLVED (UG/L)	DDE, DIS-SOLVED (UG/L)	DDT, DIS-SOLVED (UG/L)	DI-AZINON, DIS-SOLVED (UG/L)	DI-ELDRIN DIS-SOLVED (UG/L)	ENDO-SULFAN DISSOLV (UG/L)
MAY , 1981											
13...	1205	<.1	<.10	<.01	<.10	<.01	<.01	<.01	<.01	<.01	<.01
AUG , 1982											
19...	1500	--	--	--	--	--	--	--	--	--	--

DATE	ENDRIN, DIS-SOLVED (UG/L)	ETHION DISSOLV (UG/L)	HEPTA-CHLOR, DIS-SOLVED (UG/L)	HEPTA-CHLOR EPOXIDE DIS-SOLVED (UG/L)	LINDANE DIS-SOLVED (UG/L)	MALA-THION, DIS-SOLVED (UG/L)	METHO-MYL TOTAL (UG/L)	METH-OXY-CHLOR DISSOLV (UG/L)	METHYL PARA-THION, DIS-SOLVED (UG/L)	METHYL-TRI-THION DISSOLV (UG/L)	MIREX, DIS-SOLVED (UG/L)
MAY , 1981											
13...	<.01	<.01	<.01	<.01	<.01	<.01	.0	<.01	<.01	<.01	<.01
AUG , 1982											
19...	--	--	--	--	--	--	--	--	--	--	--

DATE	PARA-THION, DIS-SOLVED (UG/L)	PER-THANE DISSOLV (UG/L)	PROPHAM TOTAL (UG/L)	SEVIN, TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	TOX-APHENE, DIS-SOLVED (UG/L)	TRI-THION DISSOLV (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
MAY , 1981										
13...	<.01	<.01	.0	.00	<.10	<1.0	<.01	<.01	<.01	<.01
AUG , 1982										
19...	--	--	--	--	<.01	--	--	.02	<.01	<.01

04102618 SOUTH BRANCH BLACK RIVER AT BANGOR, MI

LOCATION.--Lat 42°18'56", long 86°06'48", in NE¼ NE¼ sec.12, T.2 S., R.16 W., Van Buren County, Hydrologic Unit 04050002, at bridge on Railroad St. at Bangor.

DRAINAGE AREA.--52.4 mi² (135.7 km²).

PERIOD OF RECORD.--April 1980 to August 1982 (discontinued).

REMARKS.--Water-quality and sediment samples were collected once a month for analysis. Discharge measurements were made at time of sampling. All data for period of record is published in this report.

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
APR , 1980										
24...	1630	64	445	--	12.5	--	--	--	--	--
MAY										
06...	1230	48	440	--	17.5	--	--	--	--	--
JUN										
09...	1345	393	223	--	16.0	--	--	--	.19	--
JUL										
10...	1500	43	423	7.7	22.0	4.2	48	--	.14	--
AUG										
07...	1140	60	391	7.5	21.5	3.3	38	--	.15	--
SEP										
04...	1800	82	371	8.0	22.0	5.5	62	--	.13	--
OCT										
15...	1415	41	458	--	11.0	--	--	--	.15	--
DEC										
05...	0900	78	462	7.2	2.0	11.8	84	--	.35	--
JAN , 1981										
12...	1615	49	450	6.7	.0	11.6	78	.70	.24	.24
FEB										
05...	1130	65	420	7.3	.0	13.2	89	--	.27	--
20...	1600	480	222	7.5	2.0	12.8	91	.28	.74	.13
MAR										
04...	1500	96	340	7.5	4.0	12.4	94	.67	.45	.44
APR										
08...	1240	56	430	8.2	12.5	9.2	85	--	.14	--
MAY										
13...	1430	370	273	7.6	13.0	--	--	--	.37	--
15...	0900	--	--	--	--	--	--	--	--	--
JUN										
11...	1445	37	460	7.8	19.0	6.7	71	--	.15	--
JUL										
06...	1200	29	416	7.7	24.0	6.1	73	--	.14	--
AUG										
06...	1030	24	445	7.8	22.0	5.6	63	--	--	--
SEP										
17...	1100	24	460	7.8	13.0	6.9	64	--	.11	--
OCT										
01...	1400	80	--	--	--	--	--	--	--	--
27...	1315	45	443	7.8	10.0	9.8	90	.75	.26	.27
NOV										
19...	0815	32	465	8.1	7.0	9.2	76	--	.14	--
DEC										
10...	1315	53	410	7.7	2.5	12.3	88	.71	.31	.31
JAN , 1982										
21...	1335	50	420	7.3	.5	9.6	64	--	.35	--
FEB										
18...	1545	56	405	7.5	2.5	10.6	74	--	.36	--
MAR										
10...	1530	50	440	7.6	2.0	11.0	78	.81	.35	.35
APR										
22...	0830	66	360	8.1	8.5	9.0	74	--	.21	--
MAY										
11...	1145	38	434	7.7	20.0	7.8	87	--	--	--
JUN										
16...	1340	34	420	7.5	18.5	4.2	45	.42	.08	.11
JUL										
20...	1215	371	285	7.5	24.0	6.2	72	--	.18	--
AUG										
18...	1315	29	473	7.5	20.0	8.9	100	--	--	--

04102618 SOUTH BRANCH BLACK RIVER AT BANGOR, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
MAY									
06...	--	--	--	--	--	--	--	--	--
JUN									
09...	.010	--	.20	--	.100	--	.73	--	.83
JUL									
10...	.080	--	.22	--	.060	--	.56	--	.62
AUG									
07...	.070	--	.22	--	.050	--	.75	--	.80
SEP									
04...	.010	--	.14	--	.070	--	.65	--	.72
OCT									
15...	.010	--	.16	--	.040	--	.36	--	.40
DEC									
05...	.010	--	.36	--	.090	--	.43	--	.52
JAN , 1981									
12...	<.010	.020	.24	.26	.130	.150	.28	.29	.41
FEB									
05...	.010	--	.28	--	.110	--	.33	--	.44
20...	.020	<.010	.76	.13	.080	.050	.43	.10	.51
MAR									
04...	<.010	<.010	.45	.44	.060	.060	.37	.17	.43
APR									
08...	.010	--	.15	--	.060	--	.69	--	.75
MAY									
13...	.020	--	.39	--	.080	--	.89	--	.97
15...	--	--	--	--	--	--	--	--	--
JUN									
11...	.020	--	.17	--	.100	--	.64	--	.74
JUL									
06...	.010	--	.15	--	.040	--	.53	--	.57
AUG									
06...	--	--	--	--	--	--	--	--	--
SEP									
17...	.010	--	.12	--	.060	--	.30	--	.36
OCT									
01...	--	--	--	--	--	--	--	--	--
27...	.010	.020	.27	.29	.110	.120	.31	.34	.42
NOV									
19...	<.010	--	.14	--	.030	--	.27	--	.30
DEC									
10...	.010	.020	.32	.33	.080	.080	.31	.30	.39
JAN , 1982									
21...	.040	--	.39	--	.130	--	.68	--	.81
FEB									
18...	.010	--	.37	--	.070	--	.68	--	.75
MAR									
10...	<.010	<.010	.35	.35	.120	.110	.33	.35	.45
APR									
22...	<.010	--	.21	--	.020	--	.42	--	.44
MAY									
11...	.020	--	<.10	--	.050	--	.61	--	.66
JUN									
16...	.020	.010	.10	.12	.040	.020	.56	.28	.60
JUL									
20...	.020	--	.20	--	.090	--	2.6	--	2.70
AUG									
10...	--	--	--	--	--	--	--	--	--

STREAMS TRIBUTARY TO LAKE MICHIGAN

04102618 SOUTH BRANCH BLACK RIVER AT BANGOR, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN,NH4 + ORG, SUSP, TOTAL (MG/L AS N)	NITROGEN,AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
APR , 1980									
24...	--	--	--	--	--	--	--	7	1.2
MAY									
06...	--	--	--	--	--	--	--	8	1.0
JUN									
09...	--	--	1.0	.090	--	.040	--	22	23
JUL									
10...	--	--	.84	.070	--	.030	--	11	1.3
AUG									
07...	--	--	1.0	.090	--	.030	--	17	2.8
SEP									
04...	--	--	.86	.000	--	.030	--	12	2.7
OCT									
15...	--	--	.56	.040	--	.020	--	5	.55
DEC									
05...	--	--	.88	.030	--	.020	--	4	.84
JAN , 1981									
12...	--	.44	.65	.040	.010	<.010	<.010	4	.53
FEB									
05...	--	--	.72	.040	--	.010	--	8	1.4
20...	--	.15	1.3	.060	.010	.030	<.010	--	--
MAR									
04...	.20	.23	.88	.060	.010	.030	<.010	8	2.1
APR									
08...	--	--	.90	.040	--	.020	--	16	2.4
MAY									
13...	--	--	1.4	.050	--	.030	--	--	--
15...	--	--	--	--	--	--	--	10	--
JUN									
11...	--	--	.91	.060	--	.040	--	18	1.8
JUL									
06...	--	--	.72	.060	--	.030	--	15	1.2
AUG									
06...	--	--	--	--	--	--	--	14	.91
SEP									
17...	--	--	.48	.060	--	.030	--	14	.91
OCT									
01...	--	--	--	--	--	--	--	13	2.8
27...	--	.46	.69	.040	.010	<.010	<.010	9	1.1
NOV									
19...	--	--	.44	.050	--	.040	--	3	.26
DEC									
10...	--	.38	.71	.020	.010	.050	.050	3	.43
JAN , 1982									
21...	--	--	1.2	.030	--	.020	--	3	.40
FEB									
18...	--	--	1.1	.020	--	.020	--	2	.30
MAR									
10...	.00	.46	.80	.040	.020	.020	<.010	13	1.8
APR									
22...	--	--	.65	.040	--	.010	--	8	1.4
MAY									
11...	--	--	--	.050	--	.020	--	13	1.3
JUN									
16...	.30	.30	.70	.050	.020	.020	<.010	8	.73
JUL									
20...	--	--	2.9	.110	--	.060	--	58	58
AUG									
10...	--	--	--	--	--	--	--	19	1.5

WATER-QUALITY DATA

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)
MAY , 1981												
13...	1430	10	60	130	18	33	11	7.6	.3	11	2.1	110

DATE	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ARSENIC TOTAL (UG/L AS AS)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)
MAY , 1981												
13...	11	14	.1	4.5	1.6	170	150	.23	170	0	1	10

DATE	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)
MAY , 1981												
13...	1	4	470	1	<4	40	<.1	4	0	80	90	30

DATE	TIME	PCB, DISSOLVED (UG/L)	PCN DISSOLV (UG/L)	ALDRIN, DISSOLVED (UG/L)	AMETRYNE TOTAL	ATRATONE TOTAL (UG/L)	ATRAZINE, TOTAL (UG/L)	CHLORDANE, DISSOLVED (UG/L)	CYANAZINE TOTAL (UG/L)	CYPRAZINE TOTAL (UG/L)
MAY , 1981										
13...	1430	<.1	<.10	<.01	<.10	<.10	.70	<.10	<.10	<.10

DATE	DDD, DISSOLVED (UG/L)	DDE, DISSOLVED (UG/L)	DDT, DISSOLVED (UG/L)	DIAZINON, DISSOLVED (UG/L)	DIELDRIN DISSOLVED (UG/L)	ENDOSULFAN DISSOLV (UG/L)	ENDRIN, DISSOLVED (UG/L)	ETHION DISSOLV (UG/L)	HEPTACHLOR, DISSOLVED (UG/L)	HEPTACHLOR EPOXIDE DISSOLVED (UG/L)
MAY , 1981										
13...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01

DATE	LINDANE DISSOLVED (UG/L)	MALATHION, DISSOLVED (UG/L)	METHOXYCHLOR DISSOLV (UG/L)	METHYL PARATHION, DISSOLVED (UG/L)	METHYLTRITHION DISSOLV (UG/L)	MIREX, DISSOLVED (UG/L)	PARATHION, DISSOLVED (UG/L)	PERTHANE DISSOLV (UG/L)	PROMETONE TOTAL (UG/L)	PROMETRYNE TOTAL (UG/L)
MAY , 1981										
13...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.1	.0

DATE	PROPAZINE TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	SIMAZINE TOTAL (UG/L)	SIMETONE TOTAL (UG/L)	SIMETRYNE TOTAL (UG/L)	TOXAPHENE, DISSOLVED (UG/L)	TRITHION DISSOLV (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
MAY , 1981										
13...	<.10	<.01	.15	<.10	<.1	<1.0	<.01	.17	<.01	<.01

04102700 SOUTH BRANCH BLACK RIVER NEAR BANGOR, MI
(Formerly published as Black River near Bangor)

LOCATION.--Lat 42°21'15", long 86°11'15", in NW¼ sec.28, T.1 S., R.16 W., Van Buren County, Hydrologic Unit 04050002, on left bank 50 ft (15 m) upstream from bridge on 66th Street, 4.9 mi (7.9 km) northwest of Bangor.

DRAINAGE AREA.--83.6 mi² (216.5 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1966 to current year.

REVISED RECORDS.--WDR MI-81: 1973-75(M), 1979(M).

GAGE.--Water-stage recorder. Altitude of gage is 610 ft (186 m) from topographic map (nearest 10 ft).

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Occasional regulation caused by mills above station.

AVERAGE DISCHARGE.--16 years, 106 ft³/s (3.002 m³/s), 17.22 in/yr (437 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,680 ft³/s (47.6 m³/s) Apr. 19, 1975, gage height, 13.16 ft (4.011 m); minimum, 20 ft³/s (0.57 m³/s) Sept. 28, 1966, gage height, 1.83 ft (0.558 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 400 ft³/s (11.3 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 14	1500	*1,260	35.7	*11.86	3.615	July 17	2100	1,210	34.3	11.70	3.566

Minimum discharge, 27 ft³/s (0.76 m³/s) Nov. 11; minimum gage height, 2.16 ft (0.658 m) Sept. 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	150	58	131	61	88	85	242	68	210	51	56	33
2	130	56	129	66	88	83	208	65	167	46	62	33
3	112	54	121	69	86	82	198	63	123	54	62	33
4	98	54	111	84	84	82	213	61	87	63	56	32
5	78	53	105	219	82	98	212	59	88	60	53	32
6	74	52	99	291	80	86	196	58	80	53	51	32
7	81	59	93	276	80	84	178	59	73	49	49	32
8	73	55	91	200	80	83	169	63	71	38	49	31
9	64	50	91	150	80	78	167	60	65	35	47	31
10	59	51	88	120	80	73	195	57	64	39	44	31
11	55	28	82	100	80	95	220	53	61	86	43	31
12	60	29	78	96	80	160	240	52	57	78	41	30
13	51	41	75	93	80	485	240	50	54	61	40	30
14	49	45	74	89	82	1170	214	49	52	60	39	30
15	52	46	73	86	84	1020	176	48	52	96	38	34
16	52	46	72	84	86	907	151	62	54	146	38	34
17	53	46	69	82	90	943	150	54	53	686	37	34
18	82	46	69	81	94	774	152	50	50	1090	36	44
19	111	47	98	80	95	624	136	52	54	825	36	40
20	112	86	94	79	95	556	122	53	56	576	36	38
21	152	168	92	78	96	572	112	53	58	358	35	38
22	107	181	87	79	100	485	102	103	55	237	35	37
23	106	151	78	80	100	388	94	122	51	156	36	36
24	149	122	67	80	100	327	89	107	48	119	35	36
25	133	105	66	80	96	285	84	90	46	101	39	35
26	76	106	64	80	94	244	82	78	45	89	37	35
27	70	236	62	80	92	202	79	107	44	80	36	35
28	66	277	63	82	90	170	75	131	42	75	35	36
29	63	219	64	84	---	155	72	125	41	68	34	36
30	61	161	62	86	---	149	69	220	50	62	34	35
31	59	---	60	88	---	211	---	234	---	59	34	---
TOTAL	2627	2728	2600	3303	2462	10768	4637	2586	2851	5596	1303	1024
MEAN	84.7	90.9	83.9	107	87.9	347	155	80.8	68.4	181	42.0	34.1
MAX	152	277	131	291	100	1170	242	234	210	1090	62	44
MIN	49	28	60	61	80	73	69	48	41	35	34	30
CFSM	1.01	1.09	1.00	1.28	1.05	4.15	1.85	.97	.82	2.17	.50	.41
IN.	1.17	1.21	1.16	1.47	1.10	4.79	2.06	1.12	.91	2.49	.58	.46

CAL YR 1981 TOTAL 36223 MEAN 99.2 MAX 1080 MIN 28 CFSM 1.19 IN 16.12
WTR YR 1982 TOTAL 41605 MEAN 114 MAX 1170 MIN 28 CFSM 1.36 IN 18.51

04102700 SOUTH BRANCH BLACK RIVER NEAR BANGOR, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--April 1980 to August 1982 (discontinued).

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: July 1980 to August 1982.
SUSPENDED-SEDIMENT DISCHARGE: July 1980 to August 1982.

REMARKS.--Sediment samples were collected on an approximate daily basis by a local observer. Water-quality samples were collected about once a month. Daily water temperature record based on once-daily measurement during the early morning hours.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum daily recorded, 24.5°C July 19, 1982; minimum daily, 0.0°C on many days during winter periods.
SEDIMENT CONCENTRATIONS: Maximum daily mean, 379 mg/L July 17, 1982; minimum daily mean, 1 mg/L on many days each year.
SEDIMENT LOADS: Maximum daily, 702 tons (637 tonnes) July 17, 1982; minimum daily, 0.02 tons (0.018 tonnes) Dec. 22, 1980.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum daily recorded, 24.5°C July 19; minimum daily recorded, 0.0°C Jan. 21.
SEDIMENT CONCENTRATIONS: Maximum daily mean, 379 mg/L July 17; minimum daily mean, 1 mg/L Nov. 16, Dec. 18, 25-31.
SEDIMENT LOADS: Maximum daily, 702 tons (637 tonnes) July 17; minimum daily, 0.12 tons (0.11 tonnes) Nov. 16.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
OCT										
01...	1425	149	--	--	--	--	--	--	--	--
14...	1245	49	475	7.8	12.0	8.9	80	--	--	--
27...	1530	78	450	8.1	10.0	9.3	85	.71	.32	.33
NOV										
19...	1030	46	480	8.1	7.5	10.9	90	--	.20	--
DEC										
10...	1530	87	390	7.9	1.0	12.9	89	.67	.47	.44
JAN										
21...	1630	77	425	7.0	.0	10.4	70	--	.44	--
FEB										
19...	0930	95	410	7.8	2.0	12.2	87	--	.49	--
MAR										
11...	0915	88	460	8.3	3.0	12.6	91	.90	.50	.50
13...	1330	497	220	7.6	3.0	12.1	89	--	1.1	--
14...	0930	1190	160	7.4	1.0	12.1	83	--	1.2	--
15...	1230	1060	180	7.7	2.5	12.1	88	1.6	1.1	1.10
18...	1130	770	200	7.9	5.0	12.6	90	--	.82	--
25...	1500	294	--	--	--	--	--	--	--	--
APR										
22...	1100	102	400	8.1	10.5	11.1	97	--	.28	--
MAY										
11...	1350	53	467	7.8	19.0	9.8	106	--	.14	--
JUN										
16...	1500	53	440	7.6	17.5	8.4	90	.81	.29	.30
JUL										
19...	1300	797	190	7.4	24.5	5.5	67	--	.30	--
AUG										
10...	1545	45	460	7.7	20.0	8.6	97	--	--	--
19...	1700	36	430	8.2	21.0	9.2	100	--	--	--

04102700 SOUTH BRANCH BLACK RIVER NEAR BANGOR, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NITRITE DISSOLVED (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)
OCT									
01...	--	--	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--
27...	.010	<.010	.33	.33	.060	.060	.40	.32	.46
NOV									
19...	<.010	--	.20	--	.010	--	.35	--	.36
DEC									
10...	.020	.020	.49	.46	.080	.070	.44	.14	.52
JAN									
21...	.030	--	.47	--	.110	--	.58	--	.69
FEB									
19...	.010	--	.50	--	.090	--	.17	--	.26
MAR									
11...	<.010	<.010	.50	.50	.120	.120	.35	.28	.47
13...	.020	--	1.1	--	.200	--	.62	--	.82
14...	.020	--	1.2	--	.160	--	.65	--	.81
15...	.020	.020	1.1	1.1	.110	.110	.64	.36	.75
18...	.020	--	.84	--	.070	--	.22	--	.29
25...	--	--	--	--	--	--	--	--	--
APR									
22...	.010	--	.29	--	.030	--	.38	--	.41
MAY									
11...	.040	--	.18	--	.030	--	.58	--	.61
JUN									
16...	.010	.010	.30	.31	<.010	<.010	--	--	.60
JUL									
19...	.030	--	.33	--	.060	--	.54	--	.60
AUG									
10...	--	--	--	--	--	--	--	--	--
19...	--	--	--	--	--	--	--	--	--

DATE	NITROGEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
OCT									
01...	--	--	--	--	--	--	--	43	17
14...	--	--	--	--	--	--	--	9	1.2
27...	--	.38	.79	.040	.020	<.010	<.010	3	.57
NOV									
19...	--	--	.56	.030	--	.030	--	6	.75
DEC									
10...	--	.21	1.0	.030	.020	.050	.050	--	--
JAN									
21...	--	--	1.2	.040	--	.020	--	12	2.5
FEB									
19...	--	--	.76	.100	--	.030	--	8	2.1
MAR									
11...	.07	.40	.97	.040	.010	.020	<.010	17	4.0
13...	--	--	1.9	.130	--	.060	--	54	72
14...	--	--	2.0	.100	--	.060	--	21	67
15...	.28	.47	1.9	.080	.040	.050	.030	13	37
18...	--	--	1.1	.060	--	.040	--	10	21
25...	--	--	--	--	--	--	--	25	20
APR									
22...	--	--	.70	.040	--	.030	--	10	2.8
MAY									
11...	--	--	.79	.050	--	.020	--	10	1.4
JUN									
16...	.10	.50	.90	.060	.030	.030	.010	16	2.3
JUL									
19...	--	--	.93	.080	--	.040	--	18	39
AUG									
10...	--	--	--	--	--	--	--	--	--
19...	--	--	--	--	--	--	--	--	--

04102700 SOUTH BRANCH BLACK RIVER NEAR BANGOR, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM
AUG 19...	1700	2.4	23	210	.00	49	21	17	.6	15

DATE	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)
AUG 19...	1.2	214	23	25	.2	10	314	275	.43

DATE	SOLIDS, DISSOLVED (TONS PER DAY)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BORON, TOTAL RECOVERABLE (UG/L AS B)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)
AUG 19...	30.5	50	4	100	100	10	5	7	290

DATE	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
AUG 19...	17	7	40	18	5	260	10	<.01	<1

DATE	TIME	SILVEX, TOTAL (UG/L)	2,4-D, TOTAL (UG/L)	2,4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
AUG 19...	1700	<.01	.01	<.01	<.01

STREAMS TRIBUTARY TO LAKE MICHIGAN

04102700 SOUTH BRANCH BLACK RIVER NEAR BANGOR, MI--CONTINUED

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	43	17	3	.47	8	2.8	5	.82	13	3.1	10	2.3
2	28	9.8	3	.45	10	3.5	6	1.1	5	1.2	9	2.0
3	17	5.1	3	.44	7	2.3	8	1.5	5	1.2	12	2.7
4	14	3.4	2	.29	6	1.8	47	11	7	1.6	9	2.0
5	13	2.6	3	.43	7	2.0	32	19	5	1.1	5	1.2
6	14	2.8	3	.42	6	1.6	24	19	9	1.9	10	2.3
7	14	3.1	3	.48	6	1.5	17	13	10	2.2	6	1.4
8	9	1.8	3	.45	5	1.2	7	3.8	24	5.2	12	2.7
9	6	1.0	3	.41	6	1.5	7	2.8	29	6.3	9	1.9
10	8	1.3	4	.55	4	.95	7	2.3	10	2.2	9	1.8
11	5	.74	3	.23	4	.89	8	2.2	6	1.3	13	3.3
12	6	.97	2	.16	5	1.1	10	2.6	6	1.3	35	15
13	7	.96	2	.22	5	1.0	160	40	8	1.7	86	113
14	6	.79	2	.24	6	1.2	127	31	5	1.1	19	60
15	5	.70	3	.37	5	.99	100	23	14	3.2	13	36
16	4	.56	1	.12	5	.97	80	18	8	1.9	14	34
17	4	.57	4	.50	3	.56	60	13	8	1.9	14	36
18	9	2.0	2	.25	1	.19	40	8.7	9	2.3	14	29
19	12	3.6	4	.51	5	1.3	44	9.5	8	2.1	11	19
20	9	2.7	16	3.7	4	1.0	57	12	12	3.1	13	20
21	7	2.9	22	10	3	.75	8	1.7	15	3.9	14	22
22	6	1.7	16	7.8	6	1.4	10	2.1	19	5.1	20	26
23	6	1.7	10	4.1	2	.38	13	2.8	12	3.2	29	30
24	2	.80	4	1.3	2	.36	17	3.7	12	3.2	23	20
25	4	1.4	5	1.4	1	.18	7	1.5	17	4.4	23	18
26	4	.82	10	2.9	1	.17	4	.86	18	4.6	19	13
27	3	.57	63	40	1	.17	11	2.4	11	2.7	17	9.3
28	2	.36	26	19	1	.17	11	2.4	11	2.7	16	7.3
29	3	.51	17	10	1	.17	83	19	---	---	14	5.9
30	4	.66	11	4.8	1	.17	35	8.1	---	---	21	8.4
31	5	.80	---	---	1	.16	9	2.1	---	---	67	38
TOTAL	---	73.71	---	111.99	---	32.43	---	280.98	---	75.7	---	583.5

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	39	25	11	2.0	40	23	14	1.9	14	2.1		
2	26	15	9	1.6	45	20	19	2.4	37	6.2		
3	34	18	7	1.2	39	13	32	4.7	26	4.4		
4	27	16	12	2.0	36	8.5	26	4.4	16	2.4		
5	20	11	12	1.9	34	8.1	24	3.9	14	2.0		
6	17	9.0	13	2.0	32	6.9	19	2.7	13	1.8		
7	20	9.6	11	1.8	21	4.1	20	2.6	11	1.5		
8	18	8.2	10	1.7	20	3.8	19	1.9	15	2.0		
9	22	9.9	14	2.3	24	4.2	13	1.2	13	1.6		
10	24	13	9	1.4	24	4.1	17	1.8	9	1.1		
11	21	12	12	1.7	20	3.3	109	25	8	.93		
12	18	12	9	1.3	21	3.2	36	7.6	12	1.3		
13	17	11	13	1.8	18	2.6	18	3.0	8	.86		
14	17	9.8	12	1.6	17	2.4	37	6.0	6	.63		
15	16	7.6	17	2.2	23	3.2	45	12	10	1.0		
16	13	5.3	22	3.7	19	2.8	31	12	---	---		
17	11	4.5	18	2.6	18	2.6	379	702	---	---		
18	16	6.6	18	2.4	19	2.6	150	441	---	---		
19	13	4.8	18	2.5	21	3.1	14	31	---	---		
20	13	4.3	18	2.6	28	4.2	18	28	---	---		
21	14	4.2	20	2.9	22	3.4	26	25	---	---		
22	11	3.0	40	11	19	2.8	34	22	---	---		
23	12	3.0	50	16	15	2.1	39	16	---	---		
24	9	2.2	36	10	14	1.8	40	13	---	---		
25	7	1.6	27	6.6	10	1.2	37	10	---	---		
26	7	1.5	33	6.9	17	2.1	36	8.7	---	---		
27	7	1.5	46	13	12	1.4	29	6.3	---	---		
28	8	1.6	61	22	11	1.2	27	5.5	---	---		
29	6	1.2	40	13	17	1.9	25	4.6	---	---		
30	7	1.3	121	72	17	2.3	20	3.3	---	---		
31	---	---	57	36	---	---	22	3.5	---	---		
TOTAL	---	233.7	---	249.7	---	145.9	---	1413.0				

04102700 SOUTH BRANCH BLACK RIVER NEAR BANGOR, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13.0	13.0	---	---	1.0	---	7.0	14.0	18.0	---	21.0	
2	12.0	13.0	3.0	2.0	1.0	2.0	7.0	---	18.0	19.0	22.0	
3	10.0	12.0	3.0	1.0	1.0	2.0	4.0	18.0	17.0	19.0	---	
4	11.0	12.0	4.0	---	1.0	---	2.0	19.0	17.0	20.0	23.0	
5	12.0	13.0	3.0	1.0	1.0	1.0	2.0	19.0	---	20.0	22.0	
6	13.0	9.0	3.0	1.0	1.0	2.0	1.0	19.0	16.0	21.0	23.0	
7	12.0	7.0	4.0	1.0	1.0	5.0	2.0	17.0	18.0	22.0	23.0	
8	11.0	8.0	2.0	1.0	1.0	2.0	4.0	18.0	20.0	23.0	23.0	
9	11.0	7.0	4.0	---	1.0	2.0	4.0	19.0	19.0	22.0	23.0	
10	12.0	5.0	1.0	---	1.0	1.0	4.0	19.0	19.0	22.0	20.0	
11	11.0	5.0	2.0	---	1.0	4.0	4.0	20.0	19.0	21.0	19.0	
12	12.0	5.0	2.0	1.0	1.0	3.0	5.0	21.0	19.0	21.0	19.0	
13	12.0	5.0	2.0	1.0	1.0	1.0	5.0	21.0	19.0	22.0	19.0	
14	12.0	4.0	3.0	1.0	1.0	.5	6.0	20.0	19.0	22.0	19.0	
15	12.0	7.0	3.0	1.0	1.0	.5	9.0	20.0	19.0	23.0	18.0	
16	---	8.0	3.0	---	1.0	2.0	11.0	20.0	17.0	23.0	---	
17	10.0	---	3.0	---	---	2.0	11.0	22.0	17.0	22.0	---	
18	10.0	5.5	3.0	1.0	1.0	2.0	12.0	22.0	17.0	---	---	
19	8.0	5.0	3.0	2.0	1.0	2.0	12.0	21.0	17.0	24.5	---	
20	9.0	4.0	---	---	1.0	2.0	12.0	21.0	17.0	24.0	---	
21	9.0	3.0	3.0	.0	---	2.0	11.0	17.0	18.0	---	---	
22	8.0	3.0	2.0	2.0	2.0	4.0	11.0	---	18.0	23.0	---	
23	8.0	---	1.0	---	3.0	4.0	12.0	16.0	18.0	23.0	---	
24	7.0	3.0	---	2.0	3.0	5.0	14.0	14.0	19.0	23.0	---	
25	7.0	---	---	2.0	2.0	4.0	14.0	15.0	19.0	23.0	---	
26	7.0	4.0	---	2.0	2.0	2.0	14.0	16.0	18.0	23.0	---	
27	9.0	3.0	---	2.0	2.0	2.0	14.0	16.0	19.0	24.0	---	
28	9.0	3.0	---	1.0	2.0	2.0	---	17.0	20.0	23.0	---	
29	10.0	3.0	---	1.0	---	4.0	14.0	18.0	19.0	22.0	---	
30	10.0	2.0	2.0	1.0	---	7.0	14.0	19.0	19.0	22.0	---	
31	11.0	---	---	1.0	---	7.0	---	19.0	---	21.0	---	
MAX	13.0	13.0	4.0	2.0	3.0	7.0	14.0	22.0	20.0	24.5		
MIN	7.0	2.0	1.0	.0	1.0	.5	1.0	14.0	16.0	19.0		

04102720 CEDAR CREEK NEAR SOUTH HAVEN, MI

LOCATION.--Lat 42°21'15", long 86°11'17", in NW¼ sec.29, T.1 S., R.16 W., Van Buren County, Hydrologic Unit 04050002, at bridge on 16th St., 4.6 mi (7.4 km) southeast of South Haven.

DRAINAGE AREA.--17.6 mi² (45.6 km²).

PERIOD OF RECORD.--April 1980 to August 1982 (discontinued).

REMARKS.--Water-quality and sediment samples were collected once a month and during high flow for analysis. Discharge measurements were made at time of sampling. All data for period of record is published in this report.

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
APR , 1980										
24...	1400	15	310	--	10.0	--	--	--	--	--
MAY										
07...	1130	10	316	--	13.0	--	--	--	--	--
JUN										
09...	1535	115	154	--	16.5	--	--	--	.29	--
JUL										
11...	0900	8.6	321	8.2	18.5	7.2	71	--	.71	--
AUG										
07...	1515	23	286	7.5	20.0	7.6	84	--	.54	--
SEP										
05...	0945	13	314	7.8	18.0	7.8	80	--	.65	--
OCT										
15...	1100	9.4	350	--	8.0	--	--	--	.68	--
DEC										
05...	1230	22	470	7.4	1.0	13.2	91	--	.68	--
JAN , 1981										
13...	1220	14	350	6.8	.0	9.2	62	1.1	.78	.77
FEB										
05...	1430	18	315	7.0	.0	11.8	79	--	.88	--
20...	1400	151	156	7.4	3.5	12.2	90	1.2	.84	.82
MAR										
05...	1030	26	280	7.4	2.0	13.0	93	1.3	.78	.75
APR										
09...	0915	30	280	7.6	10.5	9.3	81	--	.46	--
MAY										
13...	1100	98	160	7.3	10.5	9.4	83	--	.47	--
15...	0935	--	--	--	--	--	--	--	--	--
JUN										
12...	0830	6.4	320	7.6	16.5	7.3	74	--	.84	--
JUL										
06...	1630	4.2	339	8.2	22.0	9.7	113	--	.94	--
AUG										
07...	0830	5.0	365	7.9	18.5	7.2	77	1.4	.95	.99
SEP										
17...	1430	3.2	370	7.7	13.5	7.6	71	--	1.0	--
OCT										
01...	1545	69	--	--	--	--	--	--	--	--
27...	1730	11	343	7.9	10.0	9.2	84	.86	.77	.53
NOV										
19...	1200	6.4	360	8.0	7.0	11.0	90	--	.58	--
DEC										
11...	0915	11	310	7.8	.0	14.9	100	1.4	1.1	1.10
JAN , 1982										
22...	1000	12	100	7.4	.0	11.6	78	--	.88	--
FEB										
19...	1100	26	290	7.6	1.0	12.6	88	--	.84	--
MAR										
11...	1015	30	310	7.9	.5	12.6	85	1.3	1.0	.97
APR										
22...	1200	17	290	8.0	10.0	12.1	103	--	.55	--
MAY										
11...	1530	7.4	327	8.1	20.0	10.3	114	--	.56	--
JUN										
17...	0845	6.2	315	8.3	13.0	8.2	77	1.3	.88	.86
JUL										
19...	1430	49	240	7.4	23.0	5.8	67	--	1.2	--
AUG										
10...	1645	4.0	367	7.7	19.0	9.6	105	--	--	--
20...	0945	2.8	320	8.0	19.0	5.6	61	--	--	--

04102720 CEDAR CREEK NEAR SOUTH HAVEN, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NITRITE DISSOLVED (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
MAY									
07...	--	--	--	--	--	--	--	--	--
JUN									
09...	.010	--	.30	--	.030	--	.82	--	.85
JUL									
11...	.010	--	.72	--	.080	--	.39	--	.39
AUG									
07...	.020	--	.56	--	.020	--	.47	--	.49
SEP									
05...	.010	--	.66	--	.020	--	.51	--	.53
OCT									
15...	.010	--	.69	--	.040	--	4.3	--	4.30
DEC									
05...	.010	--	.69	--	.040	--	.48	--	.52
JAN , 1981									
13...	.030	.020	.81	.79	.120	.100	.37	.23	.49
FEB									
05...	.020	--	.90	--	.070	--	.51	--	.58
20...	.020	.010	.86	.83	.080	.040	.52	.31	.60
MAR									
05...	<.010	.010	.78	.76	.120	.080	.47	.45	.59
APR									
09...	.020	--	.48	--	.110	--	.27	--	.38
MAY									
13...	.020	--	.49	--	.070	--	.77	--	.84
15...	--	--	--	--	--	--	--	--	--
JUN									
12...	<.010	--	.84	--	.060	--	.39	--	.45
JUL									
06...	.010	--	.95	--	.020	--	.51	--	.53
AUG									
07...	.010	.010	.96	1.0	.030	.050	.50	.34	.53
SEP									
17...	<.010	--	1.0	--	.020	--	.33	--	.35
OCT									
01...	--	--	--	--	--	--	--	--	--
27...	<.010	<.010	.77	.53	.030	.030	.27	.30	.30
NOV									
19...	<.010	--	.58	--	.020	--	.32	--	.34
DEC									
11...	.020	.010	1.1	1.1	.090	.070	.27	.26	.36
JAN , 1982									
22...	.030	--	.91	--	.130	--	.54	--	.67
FEB									
19...	.010	--	.85	--	.120	--	.59	--	.71
MAR									
11...	<.010	<.010	1.0	.97	.130	.130	.36	.24	.49
APR									
22...	<.010	--	.55	--	.010	--	.26	--	.27
MAY									
11...	.040	--	.60	--	.050	--	.87	--	.92
JUN									
17...	.020	.010	.90	.87	.020	<.010	.38	.40	.40
JUL									
19...	.050	--	1.2	--	.040	--	.94	--	1.00
AUG									
10...	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--

04102720 CEDAR CREEK NEAR SOUTH HAVEN, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
APR, 1980									
24...	--	--	--	--	--	--	--	4	.16
MAY									
07...	--	--	--	--	--	--	--	5	.13
JUN									
09...	--	--	1.2	.080	--	.030	--	19	5.9
JUL									
11...	--	--	1.1	.040	--	.020	--	13	.30
AUG									
07...	--	--	1.1	.090	--	.020	--	19	1.2
SEP									
05...	--	--	1.2	.080	--	.030	--	11	.39
OCT									
15...	--	--	5.0	.030	--	.080	--	1	.03
DEC									
05...	--	--	1.2	.020	--	.010	--	5	.30
JAN, 1981									
13...	--	.33	1.3	.020	.010	<.010	<.010	1	.04
FEB									
05...	--	--	1.5	.020	--	<.010	--	5	.24
20...	--	.35	1.5	.070		.040		10	4.1
MAR									
05...	.06	.53	1.4	.020	.010	.030	<.010	9	.63
APR									
09...	--	--	.86	.060	--	.020	--	21	1.7
MAY									
13...	--	--	1.3	.070	--	.020	--	65	17
15...	--	--	--	--	--	--	--	10	--
JUN									
12...	--	--	1.3	.050	--	.010	--	9	.16
JUL									
06...	--	--	1.5	.050	--	.030	--	4	.05
AUG									
07...	.14	.39	1.5	.060	.040	.040	.030	12	.16
SEP									
17...	--	--	1.4	.040	--	.030	--	3	.03
OCT									
01...	--	--	--	--	--	--	--	27	5.0
27...	--	.33	1.1	.020	.010	<.010	<.010	4	.12
NOV									
19...	--	--	.92	.020	--	.030	--	2	.03
DEC									
11...	--	.33	1.5	.030	.020	.060	.050	3	.09
JAN, 1982									
22...	--	--	1.6	.020	--	.010	--	13	.42
FEB									
19...	--	--	1.6	.090	--	.030	--	2	.14
MAR									
11...	.12	.37	1.5	.020	.020	.010	<.010	12	.97
APR									
22...	--	--	.82	.030	--	.010	--	7	.32
MAY									
11...	--	--	1.5	.050	--	.030	--	5	.10
JUN									
17...	.00	.40	1.3	.060	.030	.030	.020	8	.13
JUL									
19...	--	--	2.2	.080	--	.050	--	17	2.2
AUG									
10...	--	--	--	--	--	--	--	8	.09
20...	--	--	--	--	--	--	--	5	.04

WATER-QUALITY DATA

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)
MAY , 1981											
13...	1100	3.5	60	81	13	21	6.8	3.3	.2	8	1.9
AUG , 1982											
20...	0945	31	20	170	27	43	16	8.8	.3	10	1.4

DATE	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)
MAY , 1981											
13...	68	16	5.6	.1	5.6	1.4	117	101	.16	31.0	--
AUG , 1982											
20...	146	27	12	.2	7.8	--	249	204	.34	1.9	110

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BORON, TOTAL RECOVERABLE (UG/L AS B)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)
MAY , 1981											
13...	0	--	--	1	<10	1	9	600	--	13	<4
AUG , 1982											
20...	2	100	100	--	10	2	5	340	74	3	--

DATE	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
MAY , 1981										
13...	30	--	<.1	3	0	60	60	20	--	--
AUG , 1982										
20...	70	47	--	3	--	200	--	20	<.01	<1

WATER-QUALITY DATA

DATE	TIME	PCB, DIS-SOLVED (UG/L)	PCN DISSOLV (UG/L)	ALDRIN, DIS-SOLVED (UG/L)	CHLOR-DANE, DIS-SOLVED (UG/L)	DDD, DIS-SOLVED (UG/L)	DDE, DIS-SOLVED (UG/L)	DDT, DIS-SOLVED (UG/L)	DI-AZINON, DIS-SOLVED (UG/L)	DI-ELDRIN DIS-SOLVED (UG/L)	ENDO-SULFAN DISSOLV (UG/L)
MAY , 1981											
13...	1100	<.1	<.10	<.01	<.10	<.01	<.01	<.01	<.01	<.01	<.01
AUG , 1982											
20...	0945	--	--	--	--	--	--	--	--	--	--

DATE	ENDRIN, DIS-SOLVED (UG/L)	ETHION DISSOLV (UG/L)	HEPTA-CHLOR, DIS-SOLVED (UG/L)	HEPTA-CHLOR EPOXIDE DIS-SOLVED (UG/L)	LINDANE DIS-SOLVED (UG/L)	MALA-THION, DIS-SOLVED (UG/L)	METHO-MYL TOTAL (UG/L)	METH-OXY-CHLOR DISSOLV (UG/L)	METHYL PARA-THION, DIS-SOLVED (UG/L)	METHYL-TRI-THION DISSOLV (UG/L)	MIREX, DIS-SOLVED (UG/L)
MAY , 1981											
13...	<.01	<.01	<.01	<.01	<.01	<.01	.0	<.01	<.01	<.01	<.01
AUG , 1982											
20...	--	--	--	--	--	--	--	--	--	--	--

DATE	PARA-THION, DIS-SOLVED (UG/L)	PER-THANE DISSOLV (UG/L)	PROPHAM TOTAL (UG/L)	SEVIN, TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	TOX-APHENE, DIS-SOLVED (UG/L)	TRI-THION DISSOLV (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
MAY , 1981										
13...	<.01	<.01	.0	.00	<.01	<1.0	<.01	<.01	<.01	<.01
AUG , 1982										
20...	--	--	--	--	<.01	--	--	<.01	<.01	<.01

04102730 SOUTH BRANCH BLACK RIVER NEAR KIBBIE, MI

LOCATION.--Lat 42°24'54", long 86°13'51", in NE¼ sec.1, T.1 S., R.17 W., Van Buren County, Hydrologic Unit 04050002, at bridge on 70th Street, 2.0 miles (3.2 km) northeast of South Haven.

DRAINAGE AREA.--130 mi² (337 km²).

PERIOD OF RECORD.--September 1981 to August 1982 (discontinued).

REMARKS.--Water-quality and sediment samples were collected once a month and during high flow for analysis. Discharge measurements were made at time of sampling. All data for period of record is published in this report.

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
SEP , 1981										
18...	1045	49	440	8.1	12.5	9.1	82	--	.39	--
NOV										
19...	1400	66	445	8.2	7.0	11.2	92	--	.26	--
JAN , 1982										
22...	1140	--	360	6.8	.0	11.1	74	--	.55	--
FEB										
19...	1300	179	380	7.5	1.0	12.3	85	--	.58	--
MAR										
11...	1145	203	380	7.6	1.0	12.6	83	1.1	.68	.68
MAY										
12...	0930	72	435	7.6	18.0	7.8	83	--	.19	--
JUN										
17...	1030	86	415	7.7	15.5	8.2	81	1.4	.49	.45
AUG										
10...	1100	60	470	7.7	19.0	8.2	90	--	--	--
20...	1130	53	485	8.2	21.0	7.6	83	--	--	--

DATE	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)
SEP , 1981									
18...	<.010	--	.39	--	.040	--	.22	--	.26
NOV									
19...	<.010	--	.26	--	.030	--	.24	--	.27
JAN , 1982									
22...	.030	--	.58	--	.110	--	.57	--	.68
FEB									
19...	.010	--	.59	--	.090	--	2.0	--	2.10
MAR									
11...	.010	<.010	.69	.68	.130	.130	.29	.32	.42
MAY									
12...	.020	--	.21	--	.020	--	.98	--	1.00
JUN									
17...	.010	.010	.50	.46	.020	<.010	.58	.90	.60
AUG									
10...	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--

DATE	NITRO-GEN, NH4 + ORG, SUSP, TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)
SEP , 1981									
18...	--	--	.65	.040	--	.010	--	--	--
NOV									
19...	--	--	.53	.030	--	.020	--	2	.36
JAN , 1982									
22...	--	--	1.3	.040	--	.020	--	--	--
FEB									
19...	--	--	2.7	.100	--	.030	--	5	2.4
MAR									
11...	.80	.45	1.1	.030	.010	.020	<.010	18	9.9
MAY									
12...	--	--	1.2	.050	--	.020	--	16	3.1
JUN									
17...	.80	.90	1.1	.060	.030	.030	.020	11	2.6
AUG									
10...	--	--	--	--	--	--	--	4	.65
20...	--	--	--	--	--	--	--	7	1.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

04102730 SOUTH BRANCH BLACK RIVER NEAR KIBBIE, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM
AUG , 1982										
20...	1130	2.2	17	288	.00	47	19	15	.5	14

DATE	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)
AUG , 1982									
20...	1.2	198	23	22	.2	9.0	292	256	.40

DATE	SOLIDS, DISSOLVED (TONS PER DAY)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BORON, TOTAL RECOVERABLE (UG/L AS B)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)
AUG , 1982									
20...	41.8	60	3	100	100	10	4	5	290

DATE	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
AUG , 1982									
20...	29	3	60	28	<1	240	10	<.01	<1

DATE	TIME	SILVEX, TOTAL (UG/L)	2,4-D, TOTAL (UG/L)	2,4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
AUG , 1982					
20...	1130	<.01	.01	<.01	<.01

04102731 SOUTH BRANCH BLACK RIVER NEAR SOUTH HAVEN, MI

LOCATION.--Lat 42°25'10", long 86°14'24", in NW¼ sec.1, T.1 S., R.17 W., Van Buren County, Hydrologic Unit 04050002, at bridge at 71.5 St., 1 mi (1.6 km) east of South Haven.

DRAINAGE AREA.--132 mi² (342 km²).

PERIOD OF RECORD.--April 1980 to July 1982 (discontinued).

REMARKS.--Water-quality and sediment samples were collected once a month and during high flow for analysis. Discharge measurements were made at time of sampling. All data for period of record is published in this report.

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)
APR , 1980										
23...	1700	118	405	--	16.0	--	--	--	--	--
MAY										
07...	1305	83	410	--	15.0	--	--	--	--	--
JUN										
11...	1140	557	250	--	14.0	--	--	--	.31	--
JUL										
11...	1130	32	405	8.1	21.0	5.9	66	--	.48	--
AUG										
08...	1030	182	370	7.8	21.0	7.2	79	--	.39	--
SEP										
05...	1200	101	364	7.9	19.0	7.5	79	--	.34	--
OCT										
15...	0915	119	435	--	8.0	--	--	--	.46	--
DEC										
08...	0930	381	324	7.3	7.0	10.4	85	--	.62	--
JAN , 1981										
13...	1330	--	470	6.9	.0	11.0	74	.81	.50	.51
FEB										
06...	0855	--	400	7.3	.0	12.0	81	--	.55	--
20...	1720	1430	189	7.5	1.5	12.2	88	1.3	.84	.79
21...	1015	1130	186	7.1	2.0	--	--	1.3	.84	.82
MAR										
05...	1145	233	345	7.6	2.5	13.5	98	.94	.54	.57
APR										
09...	1200	203	380	7.9	11.5	9.2	80	--	.35	--
MAY										
12...	1730	1480	165	7.4	10.0	9.4	85	--	.63	--
15...	1010	577	--	--	--	--	--	--	--	--
JUN										
12...	1035	124	450	7.6	16.5	8.2	83	--	.42	--
JUL										
07...	0930	60	434	8.1	21.0	7.1	80	--	.42	--
AUG										
07...	1045	55	440	8.1	20.0	6.2	67	.87	.38	.38
OCT										
01...	1715	297	--	--	--	--	--	--	--	--
28...	0945	100	426	7.9	8.0	9.8	84	.67	.36	.35
DEC										
14...	1045	121	410	7.7	2.0	12.6	89	2.3	.62	.63
MAR , 1982										
14...	1145	1630	130	7.4	1.0	12.2	84	--	.97	--
APR										
22...	1430	187	375	8.2	11.5	12.2	107	--	.35	--
JUL										
19...	1645	1240	175	7.3	24.0	5.1	62	--	.58	--

04102731 SOUTH BRANCH BLACK RIVER NEAR SOUTH HAVEN, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)
APR , 1980									
23...	--	--	--	--	--	--	--	--	--
MAY									
07...	--	--	--	--	--	--	--	--	--
JUN									
11...	.020	--	.33	--	.070	--	.81	--	.88
JUL									
11...	.000	--	.48	--	.000	--	.46	--	.46
AUG									
08...	.040	--	.43	--	.030	--	.41	--	.44
SEP									
05...	.010	--	.35	--	.030	--	.69	--	.72
OCT									
15...	.010	--	.47	--	.030	--	.28	--	.31
DEC									
08...	.010	--	.63	--	.010	--	--	--	--
JAN , 1981									
13...	.010	.010	.51	.52	.110	.150	.27	.14	.38
FEB									
06...	.020	--	.57	--	.080	--	.50	--	.58
20...	.020	.010	.86	.80	.070	.090	.61	.41	.68
21...	.020	.010	.86	.83	.050	.050	.64	.46	.69
MAR									
05...	<.010	<.010	.54	.57	.140	.080	.22	.29	.36
APR									
09...	.020	--	.37	--	.060	--	.41	--	.47
MAY									
12...	.020	--	.65	--	.280	--	.80	--	1.00
15...	--	--	--	--	--	--	--	--	--
JUN									
12...	.020	--	.44	--	.060	--	.34	--	.40
JUL									
07...	<.010	--	.42	--	<.010	--	.55	--	.55
AUG									
07...	.010	.010	.39	.39	.030	.040	.63	.44	.66
OCT									
01...	--	--	--	--	--	--	--	--	--
28...	.010	.010	.37	.36	.030	.040	.39	.27	.42
DEC									
14...	.010	.010	.63	.64	.060	.060		1.6	1.20
MAR , 1982									
14...	.030	--	1.0	--	.180	--	.51	--	.69
APR									
22...	.010	--	.36	--	.010	--	.29	--	.30
JUL									
19...	.040	--	.62	--	.050	--	4.5	--	4.50

04102731 SOUTH BRANCH BLACK RIVER NEAR SOUTH HAVEN, MI--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN, NH4 + ORG, SUSP, TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC DIS, (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
APR , 1980									
23...	--	--	--	--	--	--	--	14	4.5
MAY									
07...	--	--	--	--	--	--	--	10	2.2
JUN									
11...	--	--	1.2	.080	--	.030	--	33	50
JUL									
11...	--	--	.94	.060	--	.030	--	16	1.4
AUG									
08...	--	--	.87	.090	--	.020	--	20	9.8
SEP									
05...	--	--	1.1	.080	--	.040	--	16	4.4
OCT									
15...	--	--	.78	.040	--	.010	--	5	1.6
DEC									
08...	--	--	--	.070	--	.010	--	40	41
JAN , 1981									
13...	--	.29	.89	.030	.010	<.010	.020	--	--
FEB									
06...	--	--	1.2	.100	--	.020	--	--	--
20...	--	.50	1.5	.080	.030	.030	.020	53	205
21...	--	.51	1.6	.070	.030	.030	.010	39	119
MAR									
05...	.00	.37	.90	.030	.020	.020	.010	7	4.4
APR									
09...	--	--	.84	.040	--	.020	--	14	7.7
MAY									
12...	--	--	1.7	.080	--	.040	--	--	--
15...	--	--	--	--	--	--	--	26	41
JUN									
12...	--	--	.84	.060	--	.040	--	10	3.3
JUL									
07...	--	--	.97	.070	--	.030	--	21	3.4
AUG									
07...	.18	.48	1.1	.080	.040	.050	.040	2	.30
OCT									
01...	--	--	--	--	--	--	--	61	49
28...	--	.31	.79	.060	.020	.010	<.010	--	--
DEC									
14...	--		1.8	.030	.010	<.010	<.010	3	.98
MAR , 1982									
14...	--	--	1.7	.120	--	.070	--	159	700
APR									
22...	--	--	.66	.040	--	.020	--	7	3.5
JUL									
19...	--	--	5.1	.080	--	.040	--	39	131

STREAMS TRIBUTARY TO LAKE MICHIGAN

04102731 SOUTH BRANCH BLACK RIVER NEAR SOUTH HAVEN, MI--CONTINUED

WATER-QUALITY DATA

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)
MAY , 1981												
12...	1730	29	70	73	14	19	6.2	3.6	.2	9	2.3	59

DATE	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ARSENIC TOTAL (UG/L AS AS)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)
MAY , 1981												
12...	11	6.5	<.1	4.3	1.7	108	88	.15	432	0	1	20

DATE	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)
MAY , 1981												
12...	1	30	890	16	<4	60	<.1	6	0	50	50	30

DATE	TIME	PCB, TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	AMETRYNE TOTAL	ATRATONE TOTAL (UG/L)	ATRAZINE, TOTAL (UG/L)	CHLORDANE, TOTAL (UG/L)	CYANAZINE TOTAL (UG/L)	CYPRAZINE TOTAL (UG/L)	DDD, TOTAL (UG/L)
MAY , 1981										
12...	1730	<.10	<.01	<.10	<.10	1.0	<.10	<.10	<.10	<.01

DATE	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)	DIAZINON, TOTAL (UG/L)	DIELDRIN TOTAL (UG/L)	ENDOSULFAN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTACHLOR, TOTAL (UG/L)	HEPTACHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)
MAY , 1981										
12...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01

DATE	MALATHION, TOTAL (UG/L)	METHOXYCHLOR, TOTAL (UG/L)	METHYL PARATHION, TOTAL (UG/L)	MIREX, TOTAL (UG/L)	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L)	PARATHION, TOTAL (UG/L)	PERTHANE TOTAL (UG/L)	PROMETONE TOTAL (UG/L)	PROMETRYNE TOTAL (UG/L)
MAY , 1981									
12...	<.01	<.01	<.01	<.01	<.10	<.01	<.01	<.1	.0

DATE	PROPAZINE TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	SIMAZINE TOTAL (UG/L)	SIMETONE TOTAL (UG/L)	SIMETRYNE TOTAL (UG/L)	TOXAPHENE, TOTAL (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
MAY , 1981									
12...	<.10	<.01	.42	<.10	<.1	<0	.01	<.01	<.01

04103500 KALAMAZOO RIVER AT MARSHALL, MI

LOCATION.--Lat 42°15'55", long 84°57'55", on line between sec.25 and 26, T.2 S., R.6 W., Calhoun County, Hydrologic Unit 04050003, on left bank at upstream side of bridge on South Kalamazoo Ave. in Marshall.

DRAINAGE AREA.--449 mi² (1,163 km²).

PERIOD OF RECORD.--October 1948 to March 1982 (discontinued). Monthly discharge only for October 1948, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 877.09 ft (267.337 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Nov. 11, 1948, nonrecording gage at same site and datum.

REMARKS.--Records good. Diurnal fluctuation caused by powerplant above station.

AVERAGE DISCHARGE.--33 years (water years 1948-81), 315 ft³/s (8.921 m³/s), 9.53 in/yr (242 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,130 ft³/s (60.3 m³/s) Mar. 29, 1950, gage height, 8.20 ft (2.499 m); minimum, 12 ft³/s (0.34 m³/s) Aug. 2, 1967; minimum gage height, 3.00 ft (0.914 m) May 16, 1963; minimum daily discharge, 31 ft³/s (0.88 m³/s) Aug. 16, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge during period October 1981 to March 1982, 1,730 ft³/s (49.0 m³/s) Mar. 17, gage height, 7.40 ft (2.226 m); minimum daily, 216 ft³/s (6.12 m³/s) Mar. 9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	617	459	403	319	324	415						
2	694	290	329	321	381	377						
3	690	354	404	332	304	272						
4	669	375	482	404	325	301						
5	637	386	419	433	322	294						
6	557	416	233	471	361	306						
7	537	429	378	458	357	427						
8	480	279	478	401	379	244						
9	469	307	369	318	307	216						
10	382	420	333	382	317	358						
11	303	255	280	265	344	338						
12	392	285	316	324	354	496						
13	362	391	339	383	245	694						
14	355	351	285	416	291	1160						
15	420	274	348	357	386	1330						
16	265	274	378	306	336	1510						
17	290	306	234	345	321	1690						
18	388	295	272	295	349	1690						
19	469	393	262	335	303	1610						
20	396	418	281	340	287	1530						
21	413	486	258	333	352	1460						
22	476	449	394	301	391	1400						
23	378	454	315	282	400	1310						
24	416	411	274	288	398	1250						
25	480	448	261	379	268	1180						
26	399	461	331	310	265	1100						
27	328	417	310	331	309	1010						
28	489	329	332	302	304	922						
29	489	370	331	298	---	855						
30	485	454	303	289	---	833						
31	476	---	265	242	---	1000						
TOTAL	14201	11236	10197	10560	9280	27578	---	---	---	---	---	---
MEAN	458	375	329	341	331	890	---	---	---	---	---	---
MAX	694	486	482	471	400	1690	---	---	---	---	---	---
MIN	265	255	233	242	245	216	---	---	---	---	---	---
CFSM	1.02	.84	.73	.76	.74	1.98	---	---	---	---	---	---
IN.	1.18	.93	.84	.87	.77	2.28	---	---	---	---	---	---

CAL YR 1981 TOTAL 149547 MEAN 410 MAX 1100 MIN 204 CFSM .91 IN 12.39

04105000 BATTLE CREEK AT BATTLE CREEK, MI

LOCATION.--Lat 42°19'55", long 85°09'15", in NW¼ sec.5, T.2 S., R.7 W., Calhoun County, Hydrologic Unit 04050003, on right bank 350 ft (107 m) upstream from Emmett Street Bridge at Battle Creek, and 3.0 mi (4.8 km) upstream from mouth.

DRAINAGE AREA.--241 mi² (624 km²).

PERIOD OF RECORD.--October 1930 to September 1931, October 1932 to July 1933, January 1934 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1931, 1944. WSP 1507: 1956.

GAGE.--Water-stage recorder. Datum of gage is 823.24 ft (250.924 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to May 14, 1951, nonrecording gage at same site and datum.

REMARKS.--Records good. Occasional slight regulation prior to November 1943. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--49 years (water years 1931, 1935-82), 199 ft³/s (5.636 m³/s), 11.21 in/yr (285 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,640 ft³/s (103 m³/s) Apr. 7, 1947, gage height, 4.48 ft (1.366 m), from floodmark; minimum, 22 ft³/s (0.62 m³/s) Aug. 14, 1934; minimum gage height, about -0.5 ft (-.152 m) in July 1936 and on Aug. 31, 1939, due to opening of gates at dam forming control.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,510 ft³/s (71.1 m³/s) Mar. 16, gage height, 3.54 ft (1.079 m): minimum, 52 ft³/s (1.47 m³/s) Sept. 14, 15, gage height, 0.59 ft (0.180 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	265	180	282	132	121	170	692	191	233	94	90	63
2	296	175	271	127	123	168	827	184	262	99	90	62
3	333	169	254	137	125	143	828	177	303	119	84	62
4	372	164	238	168	130	118	756	175	336	148	81	61
5	378	158	223	203	134	132	696	172	321	153	81	60
6	348	154	209	223	134	136	586	167	277	142	80	60
7	308	150	198	226	134	147	543	172	233	124	78	60
8	270	148	189	220	134	148	530	180	198	112	79	60
9	238	144	182	223	133	140	478	180	185	104	74	60
10	207	138	171	189	131	138	450	170	178	99	73	58
11	181	135	138	181	134	160	450	158	172	103	78	57
12	161	130	162	174	134	207	464	150	174	103	73	56
13	147	126	154	166	134	314	486	142	167	102	69	55
14	139	126	148	163	134	486	499	134	149	102	69	53
15	135	124	146	159	137	1540	513	130	138	95	67	54
16	134	123	142	153	145	2450	514	134	137	94	65	61
17	133	123	141	148	152	2420	489	142	138	143	64	63
18	143	123	111	140	158	2320	449	151	133	161	62	76
19	161	123	125	134	153	2140	404	138	139	178	59	79
20	177	141	125	134	154	1880	377	127	152	176	71	76
21	194	165	119	132	160	1650	345	125	167	202	74	71
22	208	184	123	132	166	1490	318	136	171	219	73	73
23	214	197	126	134	176	1350	292	157	165	210	70	75
24	219	197	121	134	176	1230	271	165	152	175	68	75
25	225	188	126	134	154	1120	252	154	141	138	69	73
26	225	185	123	134	168	1010	237	142	127	114	69	71
27	220	208	128	134	160	893	224	149	123	102	72	73
28	209	227	130	134	158	767	213	180	121	99	69	82
29	199	250	131	134	---	661	203	189	119	98	66	88
30	191	276	121	131	---	593	196	192	118	94	65	89
31	185	---	132	130	---	617	---	191	---	91	63	---
TOTAL	6815	4931	4989	4863	4044	26738	13582	4954	5429	3985	2245	2006
MEAN	220	164	161	157	144	863	453	160	181	129	72.4	66.9
MAX	378	276	282	226	176	2450	828	192	336	219	90	89
MIN	133	123	111	127	121	118	196	125	118	91	59	53
CFSM	.91	.68	.67	.65	.60	3.58	1.88	.66	.75	.54	.30	.28
IN.	1.05	.76	.77	.75	.62	4.13	2.10	.76	.84	.62	.35	.31

CAL YR 1981 TOTAL 79435 MEAN 218 MAX 1300 MIN 64 CFSM .91 IN 12.26
WTR YR 1982 TOTAL 84581 MEAN 232 MAX 2450 MIN 53 CFSM .96 IN 13.06

04105500 KALAMAZOO RIVER NEAR BATTLE CREEK, MI

LOCATION.--Lat 42°19'26", long 85°11'51", in SW¼ sec.1, T.2 S., R.8 W., Calhoun County, Hydrologic Unit 04050003, on left bank 20 ft (6 m) upstream from bridge on Kendall Street in Battle Creek.

DRAINAGE AREA.--824 mi² (2,134 km²).

PERIOD OF RECORD.--July 1937 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 924: 1938-39. WSP 1387: 1938, 1945-46, 1948.

GAGE.--Water-stage recorder. Altitude of gage is 815 ft (248 m) from topographic map (nearest 5 ft). Prior to Oct. 1, 1957, water-stage recorder at site 4.7 mi (7.6 km) downstream at different datum. Oct. 1, 1957, to June 15, 1959, nonrecording gage at bridge 1,800 ft (549 m) upstream at different datum. June 16, 1959, to Oct. 13, 1960, nonrecording gage at same site and datum.

REMARKS.--Records good. Diurnal fluctuation, below 1,500 ft³/s (42.5 m³/s), caused by powerplants above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--45 years, 656 ft³/s (18.58 m³/s), 10.81 in/yr (275 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,290 ft³/s (206 m³/s) Apr. 7, 1947, gage height, 9.13 ft (2.783 m), site and datum then in use; minimum, 50 ft³/s (1.42 m³/s) Sept. 22, 1939, site then in use; minimum daily, 86 ft³/s (2.44 m³/s) Aug. 5, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,920 ft³/s (139 m³/s) Mar. 17, 18, gage height, 7.40 ft (2.256 m); minimum, 286 ft³/s (8.10 m³/s) Aug. 16, gage height, 3.11 ft (0.948 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1250	807	940	523	448	619	2270	829	1420	560	523	381
2	1280	700	793	548	519	656	2390	721	1450	633	704	406
3	1280	590	770	580	589	646	2420	792	1350	662	511	450
4	1280	630	848	710	534	404	2300	800	1310	764	469	392
5	1280	678	802	820	521	476	2130	799	1230	570	627	338
6	1220	641	701	830	553	498	1900	704	1100	658	530	337
7	1060	655	602	830	777	672	1790	781	987	588	426	395
8	1000	605	747	692	590	591	1730	855	908	701	579	418
9	920	509	705	629	558	455	1660	849	920	556	417	393
10	838	609	638	600	532	479	1610	848	1020	449	436	417
11	632	575	527	680	505	668	1610	810	891	647	409	380
12	605	498	533	520	485	885	1610	753	826	556	543	330
13	685	530	631	560	543	1480	1650	675	819	477	480	330
14	550	629	508	620	459	2060	1700	718	666	519	377	410
15	652	534	527	660	585	3010	1680	673	726	505	449	401
16	597	512	607	620	674	4330	1630	760	695	463	346	367
17	528	505	557	600	587	4820	1580	789	643	1040	441	444
18	669	525	443	600	625	4870	1540	677	750	928	400	507
19	785	556	472	600	572	4600	1480	603	714	839	406	429
20	830	741	468	578	563	4230	1400	625	972	1070	647	457
21	726	762	415	551	581	3870	1320	711	876	915	447	471
22	867	784	524	554	668	3590	1280	902	875	895	447	498
23	878	820	578	512	699	3370	1180	850	819	687	471	530
24	744	727	547	643	702	3160	1130	879	731	728	459	526
25	871	750	532	612	580	2960	920	824	683	695	475	468
26	873	827	496	560	510	2710	969	812	683	622	450	512
27	726	892	535	507	507	2460	949	923	594	736	444	556
28	786	799	536	541	596	2200	929	975	491	452	418	740
29	831	760	524	514	---	1990	903	1010	632	674	433	674
30	807	834	497	517	---	1920	861	1040	731	577	422	665
31	800	---	532	505	---	2100	---	1020	---	575	437	---
TOTAL	26850	19994	18535	18816	16062	66779	46521	25007	26412	20741	14623	13622
MEAN	866	666	598	607	574	2154	1551	807	880	669	472	454
MAX	1280	892	940	830	777	4870	2420	1040	1450	1070	704	740
MIN	528	498	415	505	448	404	861	603	491	449	346	330
CFSM	1.05	.81	.73	.74	.70	2.61	1.88	.98	1.07	.81	.57	.55
IN.	1.21	.90	.84	.85	.73	3.01	2.10	1.13	1.19	.94	.66	.61

CAL YR 1981 TOTAL 286450 MEAN 785 MAX 3330 MIN 360 CFSM .95 IN 12.93
WTR YR 1982 TOTAL 313962 MEAN 860 MAX 4870 MIN 330 CFSM 1.04 IN 14.17

04105700 AUGUSTA CREEK NEAR AUGUSTA, MI

LOCATION.--Lat 42°21'12", long 85°21'14", in SW¼ sec.27, T.1 S., R.9 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 15 ft (5 m) downstream from bridge on EF Road, and 1.3 mi (2.1 km) north of Augusta.

DRAINAGE AREA.--38.9 mi² (100.8 km²).

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 815 ft (248 m) from topographic map. Prior to June 15, 1965, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 43.0 ft³/s (1.218 m³/s), 15.01 in/yr (381 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 560 ft³/s (15.9 m³/s) June 27, 1978, gage height, 3.41 ft (1.039 m); minimum, 8.9 ft³/s (0.25 m³/s) Jan. 26, 1978, result of freezeup; minimum gage height, 0.65 ft (0.198 m) Jan. 19, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 131 ft³/s (3.71 m³/s) Mar. 14, gage height, 2.29 ft (0.698 m); minimum, 11 ft³/s (0.31 m³/s) Dec. 20, gage height, 0.68 ft (0.207 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	84	41	42	38	32	37	98	43	67	41	34	30
2	86	42	44	34	33	37	89	42	72	38	39	29
3	78	41	43	41	33	34	87	41	62	48	38	31
4	65	40	41	60	32	30	85	40	54	54	42	29
5	56	40	41	63	32	42	81	40	49	49	40	27
6	51	40	40	57	33	38	74	39	45	44	38	27
7	51	40	40	50	33	35	74	41	43	41	37	28
8	48	39	39	44	33	34	72	44	41	40	36	27
9	45	39	37	42	32	34	72	41	41	37	33	25
10	43	38	35	40	32	35	73	39	45	36	32	23
11	41	38	35	38	33	42	74	38	43	42	32	22
12	40	38	36	37	33	52	76	38	40	42	31	25
13	39	37	36	36	32	102	78	37	39	39	30	26
14	39	37	36	35	33	127	75	36	37	38	33	27
15	41	37	36	35	32	121	69	35	40	43	32	27
16	41	37	35	35	32	114	66	44	46	43	32	28
17	40	37	35	35	33	113	65	48	43	69	30	29
18	54	37	32	33	29	106	63	43	44	71	30	37
19	60	37	33	33	31	97	60	49	50	65	33	34
20	58	51	35	33	34	95	60	44	49	72	42	33
21	55	56	33	32	39	95	57	46	48	68	38	32
22	58	52	38	31	41	91	54	65	44	55	37	35
23	57	47	38	31	42	87	52	69	41	49	35	36
24	55	44	35	32	42	86	50	60	42	44	34	35
25	51	42	35	32	38	83	48	53	41	41	34	35
26	48	43	37	33	37	78	48	49	34	39	33	34
27	46	52	38	34	37	70	47	58	33	38	32	33
28	44	50	38	34	36	65	45	70	35	39	30	33
29	43	46	38	33	---	63	44	63	39	38	29	32
30	42	43	35	33	---	70	43	55	43	37	29	31
31	42	---	38	33	---	94	---	50	---	36	29	---
TOTAL	1601	1261	1154	1177	959	2207	1979	1460	1350	1436	1054	908
MEAN	51.6	42.0	37.2	38.0	34.3	71.2	66.0	47.1	45.0	46.3	34.0	30.0
MAX	86	56	44	63	42	127	98	70	72	72	42	37
MIN	39	37	32	31	29	30	43	35	33	36	29	22
CFSM	1.33	1.08	.96	.98	.88	1.83	1.70	1.21	1.16	1.19	.87	.77
IN.	1.53	1.21	1.10	1.13	.92	2.11	1.89	1.40	1.29	1.37	1.01	.86

CAL YR 1981 TOTAL 16200 MEAN 44.4 MAX 102 MIN 24 CFSM 1.14 IN 15.49
WTR YR 1982 TOTAL 16538 MEAN 45.3 MAX 127 MIN 22 CFSM 1.17 IN 15.81

04106300 PORTAGE CREEK NEAR KALAMAZOO, MI

LOCATION.--Lat 42°14'46", long 85°34'33", in SE¼ sec.34, T.2 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 25 ft (8 m) upstream from bridge on Lovers Lane, and 3.0 mi (4.8 km) south of Kalamazoo.

DRAINAGE AREA.--22.4 mi² (58.0 km²).

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder. Datum of gage is 814.88 ft (248.375 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for periods of indefinite stage-discharge relation July 16, July 19 to Aug. 5, Aug. 21 to Sept. 15, and Sept. 17-30, which are fair. Flow includes water which is pumped from ground-water sources by industry and discharged into stream 2.0 mi (3.2 km) upstream from station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 40.5 ft³/s (1.147 m³/s), 24.55 in/yr (624 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 290 ft³/s (8.21 m³/s) June 26, 1978, gage height, 4.49 ft (1.369 m); minimum, 8.0 ft³/s (0.23 m³/s) Jan. 19, 1965, gage height, 0.88 ft (0.268 m), result of bridge construction upstream.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft³/s (2.83 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Nov. 26	2100	103	2.92	2.91	0.887	Mar. 30	2200	149	4.22	3.34	1.018
Jan. 4	0600	106	3.00	2.90	0.884	May 22	0900	105	2.97	2.89	0.881
Mar. 13	0200	109	3.09	2.93	0.893	May 27	1700	110	3.12	2.95	0.899
Mar. 16	1100	102	2.89	2.86	0.872	June 1	0400	112	3.17	2.97	0.905
						July 17	0800	*258	7.31	*3.98	1.213

Minimum daily discharge, 28 ft³/s (0.79 m³/s) Aug. 22, 23, 24; minimum gage height, 1.50 ft (0.457 m) Aug. 17, Sept. 29, 30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	68	34	44	37	36	41	65	46	85	41	33	32
2	52	36	44	35	37	42	61	46	58	40	40	31
3	43	35	41	40	37	40	71	49	51	52	45	31
4	39	35	43	76	37	43	63	48	50	41	48	30
5	39	34	39	48	37	42	61	50	45	39	41	30
6	38	34	37	44	35	41	61	49	41	41	42	30
7	37	32	39	40	35	39	61	55	45	46	40	32
8	37	31	41	39	37	41	60	48	45	41	40	32
9	37	31	39	35	36	42	61	45	56	41	40	32
10	34	32	38	36	37	44	60	48	53	47	37	30
11	33	33	37	37	38	59	57	47	47	55	36	30
12	34	34	35	36	38	58	62	48	42	46	36	30
13	35	34	34	38	37	100	67	43	40	43	32	30
14	37	34	37	38	35	73	61	40	41	53	30	32
15	35	32	36	40	42	67	60	39	49	61	30	33
16	35	34	35	37	43	83	57	44	44	45	30	38
17	36	34	34	36	43	77	55	41	46	175	29	38
18	53	38	34	38	43	67	51	41	49	81	30	50
19	46	41	32	40	43	63	54	45	58	70	31	35
20	40	64	30	39	42	72	54	36	52	60	32	36
21	45	44	33	38	40	63	50	47	51	55	30	36
22	43	39	34	38	41	63	49	66	49	50	28	37
23	41	40	33	38	41	64	50	50	48	45	28	38
24	38	40	30	34	42	65	48	47	47	40	28	40
25	35	39	30	35	41	60	46	45	47	35	29	38
26	36	51	31	35	41	57	51	46	43	34	31	36
27	37	52	33	36	39	52	51	63	45	33	31	35
28	36	42	34	36	38	49	50	61	49	33	30	37
29	36	41	35	35	---	51	50	49	43	33	29	35
30	36	42	35	35	---	77	50	52	42	33	30	33
31	34	---	37	34	---	89	---	48	---	33	31	---
TOTAL	1225	1142	1114	1203	1091	1824	1697	1482	1461	1542	1047	1027
MEAN	39.5	38.1	35.9	38.8	39.0	58.8	56.6	47.8	48.7	49.7	33.8	34.2
MAX	68	64	44	76	43	100	71	66	85	175	48	50
MIN	33	31	30	34	35	39	46	36	40	33	28	30

CAL YR 1981 TOTAL 14722 MEAN 40.1 MAX 118 MIN 28
WTR YR 1982 TOTAL 15855 MEAN 43.4 MAX 175 MIN 28

04106320 WEST FORK PORTAGE CREEK NEAR OSHTEMO, MI

LOCATION.--Lat 42°14'07", long 85°38'54", in SE¼ sec.1, T.3 S., R.12 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank at upstream side of culvert on 12th Street, 2.1 mi (3.4 km) southeast of Oshtemo.

DRAINAGE AREA.--13.0 mi² (33.7 km²).

PERIOD OF RECORD.--May 1972 to current year.

GAGE.--Water-stage recorder. Datum of gage is 868.86 ft (264.829 m) Kalamazoo County Road Commission datum.

REMARKS.--Records good except those for periods of no gage-height record, Nov. 9 to Dec. 10, Dec. 14 to Jan. 21, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--10 years, 7.35 ft³/s (0.208 m³/s), 7.68 in/yr (195 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 26 ft³/s (0.74 m³/s) Aug. 31, 1975, gage height, 2.15 ft (0.655 m); minimum, 1.9 ft³/s (0.054 m³/s) July 16, 17, 18, 22, 23, 24, 25, 1981, gage height, 1.06 ft (0.323 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 13 ft³/s (0.37 m³/s) July 18, gage height, 1.73 ft (0.527 m); minimum, 2.7 ft³/s (0.076 m³/s) Aug. 23; minimum gage height, 1.14 ft (0.347 m) May 15, 18.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.7	4.7	5.5	5.4	4.6	4.7	9.5	4.0	8.5	4.1	3.5	3.2
2	8.2	4.6	5.5	5.4	4.5	4.8	8.7	3.9	7.8	4.0	4.8	3.2
3	7.7	4.6	5.5	5.6	4.5	4.6	9.3	3.9	7.2	4.7	5.5	3.3
4	6.8	4.6	5.5	7.0	4.5	4.9	8.8	3.8	6.4	4.7	5.3	3.0
5	6.2	4.7	5.4	8.4	4.5	5.1	8.3	3.9	5.8	4.7	5.3	2.9
6	5.9	4.8	5.3	8.4	4.5	5.1	7.9	3.9	5.5	4.6	5.0	2.9
7	5.3	4.8	5.1	7.5	4.5	5.0	7.6	4.1	5.1	4.5	4.7	3.0
8	5.0	4.8	5.0	6.8	4.5	4.9	7.2	4.1	4.9	4.2	4.7	3.0
9	4.7	4.9	5.0	6.2	4.3	4.9	6.8	4.0	5.3	3.8	4.5	2.9
10	4.7	4.9	4.8	5.6	4.3	5.1	6.8	3.8	5.5	4.0	4.1	2.9
11	4.5	4.9	4.9	5.0	4.3	5.7	6.8	3.7	5.2	5.3	3.9	3.1
12	4.7	4.9	4.8	5.0	4.3	6.6	6.9	3.6	5.1	5.3	3.7	3.3
13	4.7	4.9	4.8	5.0	4.3	10	7.2	3.5	4.7	5.1	3.6	3.4
14	4.7	5.0	4.9	5.0	4.4	11	7.1	3.5	4.4	5.1	3.4	3.5
15	5.0	5.0	4.8	5.0	4.5	10	6.7	3.6	4.9	4.8	3.4	3.9
16	5.0	5.2	4.8	4.9	5.0	10	6.5	3.8	5.3	4.5	3.3	4.0
17	5.0	5.4	4.8	4.7	5.5	11	6.5	3.7	5.0	11	3.3	4.2
18	6.0	5.3	4.8	4.8	5.7	10	6.2	3.7	5.0	13	3.1	5.3
19	6.8	5.2	4.8	4.8	5.8	9.6	5.9	3.8	5.4	12	3.1	5.3
20	6.6	6.0	4.9	5.0	5.6	9.7	5.9	3.7	5.5	11	3.1	5.1
21	6.0	7.0	5.0	5.1	5.5	9.7	5.6	4.2	5.6	9.2	3.1	4.8
22	6.4	6.5	5.0	4.8	5.3	9.2	5.4	5.7	5.4	7.9	3.1	4.5
23	6.2	6.0	5.0	5.0	5.1	8.9	5.4	6.3	5.1	6.7	3.1	4.3
24	6.0	5.5	5.2	5.0	5.0	8.7	5.2	6.2	4.9	5.7	3.0	4.2
25	5.7	5.2	5.2	5.0	4.8	8.6	5.0	5.6	4.6	5.0	3.1	4.0
26	5.6	5.4	5.2	5.0	4.7	8.2	4.8	5.4	4.6	4.6	3.0	4.0
27	5.3	7.0	5.3	5.0	4.6	7.5	4.5	6.5	4.4	4.3	3.0	4.1
28	5.2	6.5	5.4	4.7	4.6	7.1	4.4	7.3	4.4	4.0	3.0	4.2
29	5.0	6.0	5.4	4.7	---	6.7	4.3	7.1	4.6	3.8	3.1	4.0
30	5.0	5.8	5.4	5.0	---	7.3	4.2	8.1	4.3	3.6	3.1	4.0
31	4.8	---	5.4	4.7	---	9.9	---	8.1	---	3.5	3.1	---
TOTAL	177.4	160.1	158.4	169.5	133.7	234.5	195.4	146.5	140.4	178.7	115.0	113.5
MEAN	5.72	5.34	5.11	5.47	4.78	7.56	6.51	4.73	5.35	5.76	3.71	3.78
MAX	8.7	7.0	5.5	8.4	5.8	11	9.5	8.1	8.5	13	5.5	5.3
MIN	4.5	4.6	4.8	4.7	4.3	4.6	4.2	3.5	4.3	3.5	3.0	2.9
CFSM	.44	.41	.39	.42	.37	.58	.50	.36	.41	.44	.29	.29
IN.	.51	.46	.45	.48	.38	.67	.56	.42	.46	.51	.33	.32

CAL YR 1981 TOTAL 1810.4 MEAN 4.94 MAX 10 MIN 2.0 CFSM .38 IN 5.18
WTR YR 1982 TOTAL 1943.1 MEAN 5.32 MAX 13 MIN 2.9 CFSM .41 IN 5.56

04106400 WEST FORK PORTAGE CREEK AT KALAMAZOO, MI

LOCATION.--Lat 42°14'40", long 85°36'50", in NE¼ sec.5, T.3 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank 30 ft (9 m) upstream from culvert on Oakland Drive, 2.5 mi (4.0 km) upstream from mouth, and 3.7 mi (6.0 km) southwest of main business district of Kalamazoo.

DRAINAGE AREA.--18.7 mi² (48.4 km²).

PERIOD OF RECORD.--September 1959 to current year.

GAGE.--Water-stage recorder and V-notch sharp-crested weir. Datum of gage is 858.09 ft (261.546 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Jan. 8 to Mar. 10, which are fair. At times flow is affected by ground-water withdrawals. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 9.92 ft³/s (0.281 m³/s), 7.20 in/yr (183 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 41 ft³/s (1.16 m³/s) Apr. 19, 1975, gage height, 3.32 ft (1.012 m); minimum, 1.0 ft³/s (0.028 m³/s) Aug. 9, 1964; minimum gage height, 0.88 ft (0.268 m) July 30, 1963, caused by construction.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 36 ft³/s (1.02 m³/s) July 17, gage height, 3.13 ft (0.954 m); minimum, 6.0 ft³/s (0.17 m³/s) on many days in August and September; minimum gage height, 2.40 ft (0.732 m) Nov. 3, 4, 5, 9, 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	7.5	8.9	8.2	7.3	7.4	16	8.9	17	8.5	7.3	6.1
2	14	7.4	8.9	8.1	7.0	7.5	14	8.8	15	8.1	7.9	6.3
3	12	7.2	8.7	8.4	6.8	7.8	16	8.4	13	8.8	8.1	6.4
4	11	6.8	8.6	13	6.8	8.0	16	8.0	12	8.9	8.2	6.5
5	10	6.8	8.2	13	6.8	8.0	14	7.9	11	8.5	8.6	6.3
6	9.0	7.0	8.0	12	6.8	7.8	14	8.5	10	8.1	8.6	6.1
7	8.5	7.0	7.8	11	6.8	7.6	12	9.7	9.8	7.9	8.4	6.3
8	8.4	7.0	7.8	9.0	6.8	7.6	12	10	10	7.4	8.5	6.3
9	8.3	6.9	7.7	8.5	6.8	7.7	11	9.6	10	6.8	8.6	6.0
10	8.1	6.9	7.3	8.0	6.8	8.0	11	8.8	11	6.8	8.1	6.0
11	8.0	7.0	7.0	7.5	6.8	9.3	11	8.2	10	8.7	7.8	6.0
12	7.8	7.1	6.9	7.5	6.8	11	11	7.9	9.4	8.8	7.5	6.0
13	7.7	7.3	6.8	7.5	6.8	21	11	7.6	9.0	8.3	7.2	6.0
14	7.7	7.3	6.8	7.5	6.8	21	11	7.1	8.6	8.2	7.2	6.0
15	8.1	7.7	6.9	7.2	7.0	18	10	6.8	9.0	8.0	7.3	6.6
16	8.4	8.0	7.0	7.2	7.5	19	10	7.2	10	7.7	6.8	7.0
17	8.4	8.1	7.0	7.2	8.0	19	10	7.5	9.9	27	6.8	7.1
18	10	8.1	7.2	7.2	8.4	17	10	7.6	9.4	32	6.5	9.3
19	11	7.9	7.3	7.3	8.6	16	9.6	8.2	10	27	6.3	9.1
20	11	10	7.2	7.4	8.6	17	9.5	8.0	10	26	6.4	8.9
21	11	11	7.4	7.4	8.5	16	9.1	8.4	11	21	6.5	8.9
22	11	10	7.7	7.4	8.4	15	8.6	12	10	17	6.3	8.7
23	11	9.6	7.8	7.5	8.0	15	8.4	13	9.9	14	6.3	8.4
24	11	9.1	7.8	7.5	7.8	15	9.1	12	9.4	12	6.3	8.1
25	10	8.5	7.7	7.5	7.8	14	10	11	9.1	11	6.3	8.1
26	9.8	8.7	7.6	7.5	7.6	13	10	10	8.8	10	6.1	8.0
27	9.2	11	8.0	7.5	7.4	12	11	11	8.6	9.5	6.0	8.1
28	8.7	10	8.1	7.5	7.4	11	10	13	8.7	8.9	6.0	8.0
29	8.2	9.7	8.1	7.5	---	11	9.6	13	9.2	8.3	6.0	7.8
30	7.8	9.1	7.8	7.5	---	12	9.1	14	8.9	7.8	6.0	7.8
31	7.7	---	7.8	7.5	---	18	---	14	---	7.7	6.0	---
TOTAL	298.8	245.7	237.8	255.0	206.9	397.7	334.0	296.1	307.7	368.7	219.9	216.2
MEAN	9.64	8.19	7.67	8.23	7.39	12.8	11.1	9.55	10.3	11.9	7.09	7.21
MAX	16	11	8.9	13	8.6	21	16	14	17	32	8.6	9.3
MIN	7.7	6.8	6.8	7.2	6.8	7.4	8.4	6.8	8.6	6.8	6.0	6.0
CFSM	.52	.44	.41	.44	.40	.68	.59	.51	.55	.64	.38	.39
IN.	.59	.49	.47	.51	.41	.79	.66	.59	.61	.73	.44	.43

CAL YR 1981 TOTAL 3017.6 MEAN 8.27 MAX 16 MIN 3.7 CFSM .44 IN 6.00
WTR YR 1982 TOTAL 3384.5 MEAN 9.27 MAX 32 MIN 6.0 CFSM .50 IN 6.73

STREAMS TRIBUTARY TO LAKE MICHIGAN

04106500 PORTAGE CREEK AT KALAMAZOO, MI

LOCATION.--Lat 42°16'27", long 85°34'35", in NW¼ NE¼ sec.27, T.2 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 50 ft (15 m) upstream from bridge on Reed Avenue in Kalamazoo, and 1.5 miles (2.4 km) upstream from mouth.

DRAINAGE AREA.--46.8 mi² (121.2 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1947 to September 1958, June 1975 to current year. Monthly discharge only for some periods, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 761.50 ft (232.105 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Dec. 15, 1947, to Dec. 7, 1955, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good. Some regulation by millponds upstream from station. Flow includes water which is pumped from ground-water sources by industry and discharged into stream 5.0 mi (8.0 km) upstream from station.

AVERAGE DISCHARGE.--18 years (water years 1948-58, 1976-82), 54.3 ft³/s (1.538 m³/s), 15.76 in/yr (400 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 580 ft³/s (16.4 m³/s) sometime in July 1954 from rating curve extended above 165 ft³/s (4.67 m³/ s), gage height, 5.25 ft (1.600 m) caused by momentary gate opening of millpond; maximum gage height, 5.44 ft (1.658 m) June 26, 1978; minimum discharge, 2.0 ft³/s (0.057 m³/s) May 8, 1956, gage height, 1.50 ft (0.457 m); minimum gage height, 1.41 ft (0.430 m) May 12, 13, 1980, Aug. 16, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 358 ft³/s (10.1 m³/s) July 17, gage height, 4.74 ft (1.445 m); minimum, 3.9 ft³/s (0.11 m³/s) Apr. 29, June 19, Sept. 15, 16, 29, gage height, 1.45 ft (0.442 m); minimum daily, 35 ft³/s (0.99 m³/s) Aug. 22, 23, 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	100	44	56	48	45	48	98	58	107	48	40	41
2	72	44	56	45	46	50	77	57	88	48	55	40
3	53	44	55	50	46	48	86	57	66	66	48	40
4	48	44	56	79	46	50	81	58	63	52	50	39
5	47	42	55	95	46	50	75	58	60	50	54	39
6	46	43	50	65	45	49	72	58	54	48	53	39
7	45	40	48	57	43	47	73	65	59	53	52	41
8	45	39	51	54	43	48	70	61	58	49	54	41
9	45	38	53	52	45	50	71	58	46	47	51	42
10	42	40	49	49	45	52	72	55	77	54	46	39
11	40	41	47	47	43	71	69	55	55	70	46	39
12	41	42	47	49	42	72	69	55	51	53	45	38
13	43	41	45	49	41	133	76	52	48	50	44	38
14	45	41	46	50	40	117	71	47	47	60	42	41
15	46	41	46	51	46	99	69	46	48	52	42	43
16	44	42	46	53	53	100	67	51	57	49	41	46
17	46	43	45	51	51	107	69	51	54	261	37	46
18	66	43	42	50	51	95	64	49	56	147	37	68
19	65	51	42	52	52	85	65	58	73	106	37	45
20	52	69	40	52	52	89	66	46	63	95	53	46
21	55	65	42	51	51	86	62	57	64	69	38	47
22	50	56	43	49	50	78	60	86	58	58	35	48
23	52	49	44	51	50	78	61	73	57	54	35	48
24	50	51	41	46	51	80	60	59	54	47	35	51
25	47	48	42	45	51	76	59	56	55	43	37	48
26	47	56	42	46	49	70	64	57	52	41	40	46
27	48	70	42	46	48	64	60	71	52	42	41	46
28	46	60	43	47	46	61	59	86	61	41	39	48
29	45	54	45	45	---	63	61	64	52	42	37	47
30	45	53	44	46	---	79	61	67	51	41	39	42
31	44	---	46	45	---	123	---	66	---	41	40	---
TOTAL	1578	1434	1449	1615	1317	2318	2066	1837	1820	1977	1343	1322
MEAN	50.9	47.8	46.7	52.1	47.0	74.8	68.9	59.3	60.7	63.8	43.3	44.1
MAX	100	70	56	95	53	133	98	86	107	261	55	68
MIN	40	38	40	45	40	47	59	46	47	41	35	38

CAL YR 1981 TOTAL 18305 MEAN 50.2 MAX 153 MIN 27
WTR YR 1982 TOTAL 20074 MEAN 55.0 MAX 261 MIN 35

04106500 PORTAGE CREEK AT KALAMAZOO, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: April 1972 to August 1974, August 1975 to current year. Records for period Aug. 20 to Sept. 24, 1981 are unreliable and should not be used.

INSTRUMENTATION.--Temperature recorder April 1972 to August 1974, August 1975 to current year.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 32.5°C Mar. 4, 1981; minimum, 0.0°C Dec. 31, 1976, Jan. 1, 2, 1977.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 24.0°C Aug. 6; minimum recorded, 0.5°C Jan. 24.

REVISIONS.--The maximum water temperature in water year 1981 has been revised to 32.5°C Mar. 4, 1981.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	17.5	14.0	16.0							---	---	---
2	16.0	12.0	13.5							---	---	---
3	19.5	12.0	14.5							---	---	---
4	14.5	11.5	13.0							---	---	---
5	16.5	11.5	14.0							---	---	---
6	18.5	13.0	16.0							---	---	---
7	14.5	11.0	13.0							---	---	---
8	16.5	11.0	13.5							---	---	---
9	16.5	11.5	14.0							---	---	---
10	16.0	11.5	13.0							---	---	---
11	15.5	11.0	13.0							---	---	---
12	15.0	10.5	13.0							---	---	---
13	15.0	10.5	13.0							---	---	---
14	14.5	11.0	12.5							---	---	---
15	15.5	12.5	13.5							---	---	---
16	16.0	10.0	13.5							---	---	---
17	15.5	9.5	12.5							---	---	---
18	17.5	10.5	14.0							---	---	---
19	14.0	8.5	11.0							---	---	---
20	14.5	9.5	11.5							---	---	---
21	14.0	9.0	11.5							---	---	---
22	10.5	8.5	10.0							5.0	3.0	3.5
23	12.0	7.0	9.5							4.5	1.0	3.5
24	12.5	5.5	9.5							2.0	.5	1.5
25	14.0	7.5	10.0							3.0	1.5	2.0
26	13.5	7.5	10.0							4.0	3.0	3.5
27	11.0	9.5	10.5							3.5	2.0	2.5
28	15.0	8.0	11.0							6.0	3.5	4.5
29	---	---	---							5.0	4.5	4.5
30	---	---	---							5.5	4.5	5.0
31	---	---	---							5.5	2.5	4.0

04106500 PORTAGE CREEK AT KALAMAZOO, MI

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	5.5	2.5	4.0	6.5	4.5	5.5	11.5	8.5	9.5	18.0	13.0	15.0
2	6.0	5.0	5.5	6.5	4.5	5.5	11.0	8.5	9.5	18.5	14.0	16.5
3	6.0	4.5	5.0	5.0	3.0	4.5	10.5	5.0	8.5	18.5	15.0	17.0
4	5.5	4.5	5.0	4.5	1.5	3.0	6.5	3.0	4.5	18.5	15.5	17.0
5	5.0	4.0	4.5	6.5	3.0	4.5	6.0	2.5	5.0	17.5	14.0	15.5
6	4.5	3.0	4.0	6.5	4.5	5.5	9.5	2.5	6.5	18.0	13.0	15.0
7	4.0	2.5	3.0	5.5	4.5	5.0	9.5	6.5	9.0	19.0	13.5	16.0
8	5.0	3.5	4.0	5.0	4.0	4.5	11.0	7.5	9.5	19.5	14.5	17.0
9	5.0	4.0	4.5	6.5	4.0	5.0	8.0	6.5	7.0	21.0	16.0	18.5
10	4.0	3.0	3.5	7.0	5.0	6.0	8.5	7.0	7.5	21.0	17.5	19.0
11	4.5	3.0	3.5	7.5	6.0	6.5	10.0	9.0	9.5	22.5	17.5	19.5
12	6.0	4.0	5.0	8.0	5.5	6.5	13.5	8.0	10.0	22.0	17.5	20.0
13	6.5	6.0	6.0	6.0	4.5	5.0	---	---	---	22.0	17.5	20.0
14	6.5	5.5	6.0	7.0	4.5	5.5	---	---	---	22.0	17.5	19.5
15	8.0	6.0	7.0	7.5	5.5	6.5	---	---	---	22.5	17.5	20.0
16	8.0	5.5	7.0	7.0	6.0	6.5	15.5	13.0	14.5	22.0	18.0	20.0
17	6.5	5.0	6.0	7.0	5.5	6.0	15.0	11.5	13.5	---	---	---
18	6.0	5.5	5.5	7.0	6.0	6.5	15.5	10.0	12.5	---	---	---
19	5.5	5.0	5.5	7.0	6.0	6.5	15.5	12.0	14.0	---	---	---
20	6.0	5.0	5.5	6.5	5.5	5.5	15.5	13.0	14.5	---	---	---
21	5.5	5.0	5.5	6.5	5.5	6.0	14.0	11.0	12.5	19.5	15.0	16.0
22	6.0	5.0	5.5	9.0	5.5	7.0	15.0	11.0	13.0	15.5	14.0	14.5
23	6.0	5.0	5.5	9.5	6.5	8.0	16.5	12.0	14.5	15.5	14.5	15.0
24	5.5	4.0	4.5	9.5	7.5	8.5	17.5	13.5	15.5	15.0	13.5	14.0
25	5.5	3.5	4.5	9.0	6.5	7.5	16.5	14.0	15.0	18.0	14.0	16.0
26	6.0	3.5	4.5	6.5	5.5	6.0	16.0	12.5	14.0	18.0	15.0	16.5
27	5.5	4.5	5.0	7.5	4.0	5.5	17.0	10.0	15.0	17.5	16.0	17.0
28	6.0	4.0	5.0	9.0	5.0	7.0	16.0	12.0	13.5	19.0	16.0	17.5
29	---	---	---	11.0	6.5	8.5	16.5	12.0	13.5	20.5	16.0	18.5
30	---	---	---	10.0	9.5	9.5	17.5	12.0	15.0	22.0	17.5	19.5
31	---	---	---	9.5	8.5	9.0	---	---	---	---	---	---
MONTH	8.0	2.5	5.0	11.0	1.5	6.0						

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1							---	---	---	22.5	19.5	20.5
2							---	---	---	21.0	18.5	20.0
3							---	---	---	20.0	17.0	18.5
4							---	---	---	20.0	15.5	18.0
5							---	---	---	20.5	16.0	18.5
6							24.0	19.0	21.0	20.0	17.0	18.5
7							23.5	20.0	22.0	17.0	15.5	16.0
8							23.5	20.0	22.0	19.5	14.5	17.0
9							23.0	19.5	21.0	20.0	15.5	18.0
10							20.5	18.5	19.5	20.5	16.5	18.5
11							20.0	16.0	18.5	22.0	18.0	20.0
12							22.0	16.0	19.0	22.0	18.5	20.5
13							22.0	17.0	19.5	21.5	19.0	20.0
14							22.0	18.0	20.0	20.5	19.0	20.0
15							23.5	18.5	21.0	19.5	17.0	18.5
16							23.5	19.5	21.5	18.5	15.0	16.0
17							---	---	---	15.5	13.5	14.5
18							---	---	---	16.5	13.5	15.0
19							---	---	---	15.5	12.0	14.0
20							---	---	---	15.5	13.0	14.0
21							---	---	---	13.5	11.5	12.5
22							---	---	---	13.0	12.0	12.5
23							---	---	---	17.0	12.0	14.0
24							---	---	---	16.0	14.0	15.0
25							---	---	---	15.0	14.0	14.5
26							---	---	---	14.5	13.5	14.0
27							20.0	18.0	19.0	14.0	13.5	13.5
28							19.5	15.5	17.5	17.5	13.0	15.0
29							18.5	15.0	16.5	19.0	14.5	16.5
30							20.5	16.0	18.0	19.0	15.0	17.0
31							20.5	19.0	19.5	---	---	---
MONTH										22.5	11.5	16.5

04108500 KALAMAZOO RIVER NEAR FENNVILLE, MI

LOCATION.--Lat 42°35'36", long 85°59'03", in NE¼ sec.5, T.2 N., R.14 W., Allegan County, Hydrologic Unit 04050003, on left bank 40 ft (12 m) upstream from bridge on State Highway 89, 2.1 mi (3.4 km) downstream from Swan Creek, 4.0 mi (6.4 km) downstream from Calkins Dam, and 6.1 mi (9.8 km) east of Fennville.

DRAINAGE AREA.--1,600 mi² (4,144 km²), approximately.

PERIOD OF RECORD.--April 1929 to September 1936, October 1937 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "near Allegan" April 1929 to September 1932; as "at Calkins Bridge, near Allegan" October 1932 to September 1936, October 1937 to September 1938; as "at Calkins Dam, near Allegan" October 1938 to September 1950.

REVISED RECORDS.--WSP 1387: 1929(M), 1930, 1933, 1934-36(M), 1938(M), 1939-40, 1942.

GAGE.--Water-stage recorder. Datum of gage is 586.51 ft (178.768 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). April 1929 to September 1936 at bridge and October 1937 to September 1950 in powerplant, 4.0 mi (6.4 km) upstream at NGVD (levels by city of Allegan).

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Sept. 10-30, which are fair. Flow regulated at low and medium stages by powerplants upstream from station and since June 1936 by Calkins Dam and powerplant, 4.0 mi (6.4 km) upstream from station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--52 years, 1,412 ft³/s (39.99 m³/s), 11.98 in/yr (304 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 17,500 ft³/s (496 m³/s) Apr. 11, 1947, gage height, 606.76 ft (184.940 m), site and datum then in use; minimum daily, 50 ft³/s (1.42 m³/s) Aug. 19, 1976, caused by shutting off flow at Calkins Dam.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 7,970 ft³/s (226 m³/s) Mar. 20, gage height, 13.43 ft (4.093 m); minimum daily, 600 ft³/s (17.0 m³/s) Sept. 11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2110	1950	1950	840	1400	1520	3580	1840	2490	1500	1300	932
2	2760	1920	1900	1050	1300	1430	3570	1830	2440	1080	1700	800
3	2050	1760	1890	1290	1300	1350	3530	1810	2500	1530	1250	795
4	2490	1380	1890	1840	1300	1420	3680	1510	2590	1570	1000	780
5	2290	1710	1840	2140	1350	1500	3910	1110	2430	1510	1400	779
6	2090	1500	1700	1920	1350	1490	3700	1550	2480	1630	1900	1300
7	2170	1570	1740	2000	1400	1410	3880	1860	2390	1100	1600	1370
8	2360	1370	1840	1960	1400	1360	3460	1840	2220	1500	1200	741
9	2280	1490	1780	1900	1300	1380	3170	1830	1990	1590	1100	743
10	1990	1330	1550	1810	1200	1450	3130	1630	1970	1090	1080	690
11	1660	1710	1540	1000	1350	1570	3020	1550	1960	1110	1090	600
12	1500	1120	1540	950	1350	1630	3020	1290	1930	1500	1490	680
13	1820	1330	1490	1000	1300	2210	3290	1560	1510	1830	1340	900
14	1470	1110	1470	1700	1400	4180	3320	1800	1110	1690	883	1000
15	1140	1490	1440	2100	1450	5330	3100	1610	1500	1160	1060	1100
16	1470	1450	1130	1400	1550	5280	3040	1510	1880	1080	1060	1000
17	1710	1140	1130	1500	1560	4740	2860	1090	1940	2930	1000	800
18	1550	1140	1330	1400	1670	4940	2960	1450	1760	4710	958	1000
19	1910	1510	1530	1300	1680	4560	2800	1550	1560	4500	983	1100
20	1900	1730	1530	1500	1470	7440	2690	1860	1450	3200	1200	1300
21	1920	1560	1590	1600	1440	6650	2450	1700	1090	2500	1070	900
22	2000	1900	1340	1500	1460	6600	2430	1190	1540	2100	1070	1100
23	2010	1900	1060	1500	1470	5840	2420	1630	1920	2000	1110	1500
24	2000	1900	1330	1600	1470	5340	2410	1980	1920	1700	1100	800
25	1970	1900	1530	1600	1510	5030	2270	2140	1710	1600	1020	1000
26	1940	1890	1520	1500	1520	4540	2030	2280	1530	1200	1100	1200
27	1910	1910	1390	1400	1530	4620	2010	1930	1660	1500	1100	700
28	1870	1930	1120	1350	1520	3860	1990	1960	1460	1600	1090	1200
29	1740	1970	1120	1350	---	3410	1990	1900	1740	1700	978	1100
30	1180	2000	1420	1350	---	3880	1910	2230	1760	1100	1060	1100
31	1580	---	1490	1400	---	3680	---	2980	---	1200	1090	---
TOTAL	59940	48800	47070	44750	40000	111680	87620	54810	56350	56010	36302	29010
MEAN	1934	1627	1518	1508	1429	3603	2921	1742	1878	1807	1171	967
MAX	2050	2000	1950	2140	1680	7440	3910	2980	2590	4710	1900	1500
MIN	1140	1110	1060	840	1200	1350	1910	1090	1090	1080	883	600
CFSM	1.21	1.02	.95	.94	.89	2.25	1.83	1.09	1.17	1.13	.73	.60
IN.	1.39	1.13	1.09	1.09	.93	2.48	2.04	1.26	1.31	1.30	.84	.67

CAL YR 1981 TOTAL 625286 MEAN 1713 MAX 4670 MIN 786 CFSM 1.07 IN 14.54
WTR YR 1982 TOTAL 673542 MEAN 1845 MAX 7440 MIN 600 CFSM 1.15 IN 15.66

04108600 RABBIT RIVER NEAR HOPKINS, MI

LOCATION.--Lat 42°38'32", long 85°43'19", in SE¼ sec.16, T.3 N., R.12 W., Allegan County, Hydrologic Unit 04050003, on left bank at downstream side of bridge on 18th Street, 2.5 mi (4.0 km) northeast of Hopkins.

DRAINAGE AREA.--71.4 mi² (184.9 km²).

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 700 ft (213 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Mar. 8 to Apr. 19, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--17 years, 56.7 ft³/s (1.606 m³/s), 10.78 in/yr (274 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,180 ft³/s (33.4 m³/s) June 26, 1978, gage height, 9.56 ft (2.914 m); minimum not determined; minimum daily, 9.2 ft³/s (0.26 m³/s) Aug. 27, 28, 1970, Sept. 18, 1971; minimum gage height, 1.89 ft (0.576 m) Aug. 28, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 475 ft³/s (13.5 m³/s) Mar. 14, from correlation with nearby stations, only peak above base of 300 ft³/s (8.50 m³/s); minimum, 14 ft³/s (0.40 m³/s) Sept. 13; minimum gage height, 1.96 ft (0.597 m) Aug. 18.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	120	42	56	37	27	35	160	50	50	30	20	17
2	115	41	69	43	27	33	150	47	50	28	20	18
3	82	40	67	42	28	30	140	46	42	28	20	18
4	60	39	59	84	28	30	140	45	39	31	38	17
5	58	39	54	101	28	30	130	44	37	29	29	16
6	59	40	51	82	30	31	120	43	35	27	26	16
7	60	40	49	63	30	32	110	43	34	27	24	17
8	49	38	47	54	30	32	110	47	37	27	23	16
9	45	36	43	50	30	33	110	44	34	25	22	16
10	42	35	40	46	30	35	120	42	34	26	21	15
11	40	35	39	45	30	40	130	40	33	35	20	15
12	39	34	38	45	28	90	140	39	32	33	20	15
13	38	34	36	45	27	180	140	39	31	28	19	15
14	38	33	36	45	27	400	130	37	30	26	18	15
15	42	33	35	42	28	360	120	36	31	25	18	18
16	43	32	34	38	30	320	120	43	34	24	17	18
17	42	32	33	36	31	340	110	43	32	74	17	18
18	75	32	31	33	31	290	110	39	31	50	16	24
19	115	32	31	30	32	250	103	40	38	35	16	22
20	84	102	30	29	32	260	89	42	43	31	19	21
21	67	128	30	29	33	240	79	41	37	28	18	21
22	84	92	30	28	34	230	71	48	35	26	17	21
23	75	69	30	28	35	210	66	53	32	25	17	20
24	70	58	30	28	35	190	62	47	30	24	17	20
25	62	51	30	28	33	170	58	43	29	23	25	20
26	55	55	30	29	33	160	59	41	31	22	23	19
27	50	134	30	29	35	140	58	44	31	22	20	19
28	47	101	29	29	35	120	55	71	30	24	19	19
29	45	71	30	28	---	130	52	55	35	22	18	19
30	44	58	33	27	---	140	50	65	33	21	19	18
31	43	---	37	27	---	150	---	52	---	21	18	---
TOTAL	1880	1606	1217	1300	857	4731	3092	1409	1050	897	634	543
MEAN	60.6	53.5	39.3	41.9	30.6	153	103	45.5	35.0	28.9	20.5	18.1
MAX	120	134	69	101	35	400	160	71	50	74	38	24
MIN	38	32	29	27	27	30	50	36	29	21	16	15
CFSM	.85	.75	.55	.59	.43	2.14	1.44	.64	.49	.41	.29	.25
IN.	.98	.84	.63	.68	.45	2.46	1.61	.73	.55	.47	.33	.28

CAL YR 1981 TOTAL 22883 MEAN 62.7 MAX 695 MIN 19 CFSM .88 IN 11.92
WTR YR 1982 TOTAL 19216 MEAN 52.6 MAX 400 MIN 15 CFSM .74 IN 10.01

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI

(National stream-quality accounting network and pesticide station)

LOCATION.--Lat 42°38'50", long 86°11'53", in NE¼ sec.16, T.3 N., R.16 W., Allegan County, Hydrologic Unit 04050003, at bridge on Old US-31 between Saugatuck and Douglas, 7.9 mi (12.7 km) downstream from Rabbit River, 17.6 mi (28.3 km) downstream from gaging station near Fennville (04108500), and 2.9 mi (4.7 km) upstream from mouth.

DRAINAGE AREA.--2,020 mi² (5,230 km²), approximately.

PERIOD OF RECORD.--Water years 1974 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1974 to September 1981.
WATER TEMPERATURES: May 1975 to September 1981.

INSTRUMENTATION.--Water-quality monitor November 1975 to September 1981.

REMARKS.--Because of bridge repairs at established site location, water-quality sampling for May, July, and September was done at bridge on 58th Street, 5.7 mi (9.2 km) upstream. Water-discharge measurements made at time of sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded (water years 1974-75, 1979-81), 747 micromhos Apr. 30, 1980; minimum recorded (water years 1974-75, 1978-79, 1981), 172 micromhos Sept. 18, 1978.
WATER TEMPERATURES: Maximum recorded (water years 1975, 1977-81), 31.5°C July 20, 1977; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV												
03...	1130	1880	567	8.0	11.0	9.2	84	--	K31	250	35	69
DEC												
16...	1500	1590	595	7.9	2.0	12.4	91	--	--	270	50	75
MAR												
24...	1300	6940	351	7.0	7.0	11.1	94	--	<5	170	38	46
MAY												
25...	1400	E2470	572	7.0	16.0	6.6	67	350	400	250	37	66
JUL												
07...	1000	E2090	561	7.0	24.0	6.8	83	220	210	250	49	64
SEP												
28...	1130	E998	610	7.7	14.0	8.9	98	73	K53	260	68	66

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
NOV												
03...	20	19	14	1.5	220	--	31	.2	8.6	352	--	.48
DEC												
16...	20	12	9	1.0	220	35	24	.2	5.8	350	306	.48
MAR												
24...	13	8.0	9	2.7	130	32	13	.1	6.5	240	200	.33
MAY												
25...	21	18	13	2.0	214	51	29	.2	6.6	389	322	.53
JUL												
07...	21	19	14	1.5	197	40	30	.3	7.0	348	301	.47
SEP												
28...	22	24	17	1.0	219	40	36	.2	6.1	333	334	.45

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV												
03...	1790	1.3	.270	.33	.96	.020	.06	.010	<.010	9	46	100
DEC												
16...	1500	1.2	.190	.24	.82	.070	.21	.040	.030	4	17	100
MAR												
24...	4500	1.5	.170	.26	.90	.080	.25	.070	.050	13	244	100
MAY												
25...	--	1.2	.210	.27	.89	.160	.49	.070	.060	--	--	--
JUL												
07...	--	.82	.030	.04	1.30	.160	.49	.050	.030	20	--	100
SEP												
28...	897	.97	.100	.13	.90	.150	.46	.050	.040	13	35	100

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
DEC										
16...	1500	1	1	<100	49	<1	<1	10	<10	<1
MAR										
24...	1300	2	1	100	47	1	<1	20	10	1
JUL										
07...	1000	2	1	100	69	1	1	10	<10	1
SEP										
28...	1130	2	1	100	79	1	<1	10	10	<1

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
DEC										
16...	<1	11	2	350	7	2	<1	50	39	<.1
MAR										
24...	<1	7	3	670	91	7	4	40	17	.2
JUL										
07...	<1	--	6	810	41	7	4	80	4	1.6
SEP										
28...	<1	7	4	320	48	4	<1	40	11	2.2

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
DEC									
16...	<.1	2	<1	<1	<1	<1	<1	50	<4
MAR									
24...	.2	10	4	<1	<1	<1	<1	20	<4
JUL									
07...	.1	5	3	<1	<1	<1	<1	30	8
SEP									
28...	1.0	5	4	<1	<1	<1	<1	10	<4

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	PCB, TOTAL (UG/L)	PCB, TOTAL IN BOTTOM MATERIAL (UG/KG)	ALDRIN, TOTAL (UG/L)	ALDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	CHLORDANE, TOTAL (UG/L)	CHLORDANE, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDD, TOTAL (UG/L)	DDD, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDE, TOTAL (UG/L)	DDE, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDT, TOTAL (UG/L)
NOV												
03...	1130	--	77	--	<.1	--	<1.0	--	<.1	--	<.1	--
MAR												
24...	1300	<.10	--	<.01	--	<.10	--	<.01	--	<.01	--	<.01
MAY												
25...	1400	<.10	12	<.01	<.1	<.10	<1.0	<.01	.1	<.01	<.1	<.01

DATE	DDT, TOTAL IN BOTTOM MATERIAL (UG/KG)	DIAZINON, TOTAL (UG/L)	DIELDRIN TOTAL (UG/L)	DIELDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ENDOSULFAN, TOTAL (UG/L)	ENDOSULFAN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ENDRIN, TOTAL (UG/L)	ENDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ETHION, TOTAL (UG/L)	HEPTACHLOR, TOTAL (UG/L)	HEPTACHLOR, TOTAL IN BOTTOM MATERIAL (UG/KG)	HEPTACHLOR EPOXIDE TOTAL (UG/L)
NOV												
03...	<.1	--	--	<.1	--	<.1	--	<.1	--	--	<.1	--
MAR												
24...	--	.01	<.01	--	<.01	--	<.01	--	<.01	<.01	--	<.01
MAY												
25...	<.1	<.01	<.01	<.1	<.01	<.1	<.01	<.1	<.01	<.01	<.1	<.01

DATE	HEPTACHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG)	LINDANE TOTAL (UG/L)	LINDANE TOTAL IN BOTTOM MATERIAL (UG/KG)	MALATHION, TOTAL (UG/L)	METHOXYCHLOR, TOTAL (UG/L)	METHOXYCHLOR, TOT. IN BOTTOM MATL. (UG/KG)	METHYL PARATHION, TOTAL (UG/L)	METHYL TRITHION, TOTAL (UG/L)	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L)	PCN, TOTAL IN BOTTOM MATERIAL (UG/KG)	MIREX, TOTAL (UG/L)
NOV											
03...	<.1	--	<.1	--	--	<.1	--	--	--	<1.0	--
MAR											
24...	--	<.01	--	<.01	<.01	--	<.01	<.01	<.10	--	<.01
MAY											
25...	<.1	<.01	<.1	<.01	<.01	<.1	<.01	<.01	<.10	<1.0	<.01

DATE	MIREX, TOTAL IN BOTTOM MATERIAL (UG/KG)	PARATHION, TOTAL (UG/L)	PERTHANE IN BOTTOM MATERIL (UG/KG)	PERTHANE TOTAL (UG/L)	TOXAPHENE, TOTAL (UG/L)	TOXAPHENE, TOTAL IN BOTTOM MATERIAL (UG/KG)	TOTAL TRITHION (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
NOV											
03...	<.1	--	<.10	--	--	<1.0	--	--	--	--	--
MAR											
24...	--	<.01	--	<.10	<1	--	<.01	<.01	<.01	<.01	<.01
MAY											
25...	<.1	<.01	<1.00	<.10	<1	<10	<.01	.08	<.01	<.01	<.01

04108800 MACATAWA RIVER NEAR ZEELAND, MI

LOCATION.--Lat 42°46'40", long 86°01'06", in NW¼ sec.31, T.5 N., R.14 W., Ottawa County, Hydrologic Unit 04050002, on left bank 20 ft (6 m) upstream from bridge on State Road, 0.2 mi (0.3 km) downstream from South Branch, and 2.5 mi (4.0 km) south of Zeeland.

DRAINAGE AREA.--65.8 mi² (170.4 km²).

PERIOD OF RECORD.--October 1960 to current year. Prior to October 1978, published as Black River near Zeeland.

GAGE.--Water-stage recorder. Datum of gage is 585.7 ft (178.52 m) National Geodetic Vertical Datum of 1929 (levels by Gove Associates, Inc.).

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 65.1 ft³/s (1.844 m³/s), 13.44 in/yr (341 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,220 ft³/s (204 m³/s) May 11, 1981, gage height, 15.81 ft (4.819 m); minimum, 0.9 ft³/s (0.025 m³/s) Aug. 24, 1962; minimum gage height, 1.66 ft (0.506 m) Aug. 23, 24, 1981.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 900 ft³/s (25.5 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 14	0100	3,250	92.0	13.20	4.023	July 17	1500	*4,600	130	*14.37	4.380

Minimum discharge, 4.2 ft³/s (0.12 m³/s) July 16, gage height, 1.68 ft (0.512 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	239	12	68	14	13	59	179	20	43	5.9	10	8.5
2	77	12	194	15	13	56	80	19	37	5.1	11	8.5
3	31	11	123	16	13	48	255	18	18	7.7	13	8.5
4	20	11	70	145	13	58	74	18	14	8.7	358	7.4
5	16	11	52	150	14	55	104	17	13	6.6	186	6.7
6	31	13	45	90	14	42	97	17	11	5.4	49	7.1
7	24	12	42	60	14	36	97	18	10	8.4	28	6.9
8	16	11	42	40	15	27	90	18	10	7.3	21	6.9
9	13	10	33	25	15	26	102	16	9.7	5.2	16	6.4
10	12	9.6	25	23	15	25	194	16	11	5.5	14	6.0
11	10	9.4	29	22	15	54	317	14	9.2	18	12	5.8
12	9.6	8.8	19	22	15	256	515	16	8.3	13	11	5.4
13	9.1	8.6	18	21	15	2030	582	16	8.3	8.0	9.4	5.3
14	8.7	8.6	18	21	15	2480	220	14	7.2	6.5	8.8	5.5
15	15	8.8	18	20	20	1360	103	13	10	5.7	8.5	6.8
16	15	8.5	17	18	27	909	187	17	11	4.8	7.6	6.4
17	13	8.4	16	17	33	778	238	13	9.4	2500	7.0	6.5
18	60	8.2	13	16	43	331	104	10	8.7	1970	6.2	18
19	114	8.6	13	15	50	215	63	11	11	734	5.4	11
20	46	119	13	15	63	291	69	16	9.7	137	10	10
21	31	150	13	14	60	248	50	13	8.5	62	8.8	8.9
22	95	111	13	14	58	162	38	16	8.3	41	6.9	8.2
23	48	77	13	14	64	131	33	16	7.7	33	6.6	7.6
24	44	55	13	14	75	154	31	14	6.4	26	6.0	7.4
25	29	42	13	14	95	129	28	13	7.0	21	78	7.0
26	22	150	13	14	95	74	26	12	10	18	21	6.7
27	19	491	13	14	80	49	24	24	9.1	17	11	6.9
28	16	139	13	14	68	43	22	72	8.2	16	8.7	6.7
29	15	70	13	13	---	44	21	36	11	14	8.0	6.3
30	14	49	13	13	---	174	21	47	7.9	12	9.4	5.7
31	13	---	14	13	---	646	---	27	---	11	8.8	---
TOTAL	1125.4	1643.5	1012	916	1030	10990	3964	607	353.6	5733.8	965.1	225.0
MEAN	36.3	54.8	32.6	29.5	36.8	355	132	19.6	11.8	185	31.1	7.50
MAX	239	491	194	150	95	2480	582	72	43	2500	358	18
MIN	8.7	8.2	13	13	13	25	21	10	6.4	4.8	5.4	5.3
CFSM	.55	.83	.50	.45	.56	5.40	2.01	.30	.18	2.81	.47	.11
IN.	.64	.93	.57	.52	.58	6.21	2.24	.34	.20	3.24	.55	.13

CAL YR 1981 TOTAL 30279.0 MEAN 83.0 MAX 4600 MIN 3.0 CFSM 1.26 IN 17.12
WTR YR 1982 TOTAL 28565.4 MEAN 78.3 MAX 2500 MIN 4.8 CFSM 1.19 IN 16.15

04109000 GRAND RIVER AT JACKSON, MI

LOCATION.--Lat 42°17'05", long 84°24'30", in sec.22, T.2 S., R.1 W., Jackson County, Hydrologic Unit 04050004, on left bank of sewage-treatment plant, 1 mi (2 km) north of Jackson, 2.2 mi (3.5 km) upstream from Portage River, and at mile 216 (348 km).

DRAINAGE AREA.--174 mi² (451 km²).

PERIOD OF RECORD.--April 1935 to current year.

REVISED RECORDS.--WSP 974: 1937(M). WSP 1387: 1936. WSP 1727: 1950(M).

GAGE.--Water-stage recorder. Datum of gage is 900.00 ft (274.320 m) Fargo Engineering Co. datum. Prior to Sept. 24, 1935, nonrecording gage at same site and datum.

REMARKS.--Records good. Slight regulation by mills above station. Flow includes about 17 ft³/s (0.48 m³/s) as sewage effluent, which originates from ground water sources, from the city of Jackson. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--47 years, 121 ft³/s (3.427 m³/s), 9.44 in/yr (240 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,070 ft³/s (30.3 m³/s) June 25, 1937, gage height, 13.50 ft (4.115 m); maximum gage height, 15.44 ft (4.706 m) June 25, 1968; minimum discharge, 9.2 ft³/s (0.26 m³/s) Aug. 22, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 641 ft³/s (18.2 m³/s) Mar. 30, gage height, 13.54 ft (4.127 m); minimum, 31 ft³/s (0.88 m³/s) Sept. 12, gage height, 8.32 ft (2.536 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	289	177	165	83	125	110	497	179	220	89	59	53
2	295	181	117	90	149	114	485	172	242	84	71	51
3	269	181	107	110	91	160	500	166	259	125	68	44
4	241	178	111	140	79	155	482	124	258	95	80	38
5	277	183	103	160	82	161	450	117	228	95	118	35
6	298	175	110	160	78	155	430	113	203	147	120	35
7	264	160	163	140	72	145	427	147	204	158	62	43
8	229	108	164	120	82	100	418	143	202	138	64	44
9	229	105	160	100	83	97	405	136	198	87	64	42
10	174	105	155	95	86	100	393	188	189	83	63	42
11	136	104	134	90	140	154	383	196	137	77	62	39
12	137	101	89	95	143	199	379	193	109	82	62	34
13	174	100	87	100	140	358	395	191	95	133	61	42
14	176	139	93	96	138	374	383	187	95	137	56	82
15	170	147	90	98	152	420	363	176	110	126	48	90
16	163	150	89	139	153	473	363	165	103	77	52	68
17	117	150	104	138	145	505	364	161	100	110	56	124
18	103	146	139	141	147	526	345	113	145	78	55	135
19	106	100	138	140	146	547	337	98	180	90	52	114
20	149	140	100	92	105	546	339	96	181	142	76	63
21	170	113	81	81	94	573	322	100	174	142	52	62
22	171	115	77	78	105	577	277	117	168	94	46	62
23	172	174	82	75	115	580	252	119	125	88	53	59
24	131	214	76	71	160	576	237	170	106	79	55	64
25	106	227	80	77	157	565	223	174	103	67	66	114
26	117	192	122	79	154	551	219	175	97	72	56	100
27	193	172	145	81	110	534	211	189	93	74	56	147
28	195	168	143	129	102	519	202	185	150	162	49	92
29	193	166	139	140	---	499	194	177	158	93	46	82
30	191	169	119	140	---	519	187	165	144	82	53	135
31	183	---	75	114	---	519	---	129	---	70	52	---
TOTAL	5818	4540	3557	3392	3333	11431	10462	4761	4776	3168	1933	2135
MEAN	188	151	115	109	119	369	349	154	159	102	62.4	71.2
MAX	298	227	165	160	160	580	500	196	259	162	120	147
MIN	103	100	75	71	72	97	187	96	93	67	46	34
CFSM	1.08	.87	.66	.63	.68	2.12	2.01	.89	.91	.59	.36	.41
IN.	1.24	.97	.76	.73	.71	2.44	2.24	1.02	1.02	.68	.41	.46

CAL YR 1981 TOTAL 60047 MEAN 165 MAX 400 MIN 51 CFSM .95 IN 12.84
WTR YR 1982 TOTAL 59306 MEAN 162 MAX 580 MIN 34 CFSM .93 IN 12.68

04111000 GRAND RIVER NEAR EATON RAPIDS, MI

LOCATION.--Lat 42°32'05", long 84°37'25", in NE¼ sec.26, T.2 N., R.3 W., Eaton County, Hydrologic Unit 04050004, on right bank 400 ft (122 m) upstream from bridge on Petrieville Highway, 2 mi (3 km) northeast of Eaton Rapids, 2.5 mi (4.0 km) downstream from Spring Brook, 25 mi (40 km) upstream from Red Cedar River, and at mile 178 (286 km).

DRAINAGE AREA.--661 mi² (1.712 km²).

PERIOD OF RECORD.--October 1950 to September 1982 (discontinued). Gage-height record for flood seasons collected in this vicinity 1905-28 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1707: 1951(M).

GAGE.--Water-stage recorder. Datum of gage is 852.68 ft (259.897 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation caused by powerplant at Smithville and mills at Eaton Rapids. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--32 years, 462 ft³/s (13.08 m³/s), 9.49 in/yr (241 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,500 ft³/s (99.1 m³/s) Feb. 21, 1971; maximum gage height, 8.19 ft (2.496 m) June 28, 1968; minimum discharge, 14 ft³/s (0.40 m³/s) Dec. 20, 1962, Oct. 14, 1966; minimum gage height, 0.67 ft (0.204 m) Dec. 20, 1962; minimum daily discharge, 21 ft³/s (0.59 m³/s) Oct. 12, 1964.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 4, 1950, reached a stage of 8.15 ft (2.484 m), discharge, 3,860 ft³/s (109 m³/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,240 ft³/s (91.8 m³/s) Mar. 17, gage height, 7.82 ft (2.384 m); minimum, 46 ft³/s (1.30 m³/s) Sept. 10, gage height, 1.07 ft (0.326 m); minimum daily, 60 ft³/s (1.70 m³/s) Sept. 13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	745	580	583	343	280	430	2460	666	864	452	249	139
2	838	580	544	538	280	440	2520	712	928	345	249	151
3	926	570	560	348	280	440	2360	674	958	370	216	183
4	1020	580	555	366	280	430	2180	634	984	412	183	130
5	1010	610	511	494	280	420	2080	599	900	464	244	118
6	936	542	423	540	280	400	1900	564	828	383	252	131
7	860	550	509	662	280	350	1780	550	757	358	242	139
8	805	578	500	516	280	380	1700	524	702	353	263	121
9	782	557	391	500	290	440	1630	543	658	348	186	109
10	732	492	452	450	290	450	1680	562	652	346	191	156
11	691	469	472	400	290	403	1720	560	565	283	187	82
12	651	445	467	350	300	591	1710	550	556	295	178	178
13	612	392	398	330	300	1590	1690	534	523	284	173	60
14	584	350	390	360	310	2350	1630	552	373	282	177	186
15	522	371	362	370	310	2630	1560	544	403	338	173	95
16	567	389	357	370	320	3150	1480	526	362	333	164	193
17	469	374	348	360	330	3210	1420	511	410	451	158	202
18	462	406	354	330	340	3090	1380	448	367	346	156	186
19	491	401	296	320	350	2980	1390	445	481	509	152	215
20	460	493	265	320	370	2820	1360	366	500	391	155	310
21	459	579	414	310	390	2700	1300	279	592	314	153	162
22	474	540	318	310	410	2620	1240	347	607	422	162	199
23	481	617	346	310	430	2560	1160	410	566	340	135	177
24	490	568	367	300	440	2510	1090	390	562	313	133	195
25	500	548	351	300	440	2450	1030	403	524	238	155	202
26	520	559	410	300	440	2350	968	437	417	234	189	189
27	520	674	294	290	430	2210	919	449	359	231	138	276
28	540	697	350	290	430	2070	869	519	381	247	144	382
29	560	604	351	280	---	1950	851	563	373	354	187	396
30	580	603	484	280	---	1900	799	587	393	326	133	362
31	600	---	513	280	---	2290	---	571	---	279	139	---
TOTAL	19887	15718	12955	11517	9450	52604	45856	16019	17545	10641	5616	5624
MEAN	642	524	418	372	338	1697	1529	517	585	343	181	187
MAX	1020	697	583	662	440	3210	2520	712	984	509	263	396
MIN	459	350	265	280	280	350	799	279	359	231	133	60
CFSM	.97	.79	.63	.56	.51	2.57	2.31	.78	.89	.52	.27	.28
IN.	1.12	.88	.73	.65	.53	2.96	2.58	.90	.99	.60	.32	.32

CAL YR 1981 TOTAL 209706 MEAN 575 MAX 2710 MIN 97 CFSM .87 IN 11.80
WTR YR 1982 TOTAL 223432 MEAN 612 MAX 3210 MIN 60 CFSM .93 IN 12.57

04111379 RED CEDAR RIVER NEAR WILLIAMSTON, MI

LOCATION.--Lat 42°40'59", long 84°13'09", in NE¼ sec.4, T.3 N., R.2 E., Ingham County, Hydrologic Unit 04050004, on right bank 20 ft (6 m) upstream from bridge on State Highway 52, 1.5 mi (2.4 km) upstream from Squaw Creek, and 3.5 mi (5.6 km) east of Williamston.

DRAINAGE AREA.--163 mi² (422 km²).

PERIOD OF RECORD.--July 1975 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 870 ft (265 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--7 years, 101 ft³/s (2.860 m³/s), 8.41 in/yr (214 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,390 ft³/s (39.4 m³/s) Mar. 15, 1982, gage height, 8.42 ft (2.566 m); minimum, 5.1 ft³/s (0.14 m³/s) Sept. 12, 1978, gage height, 2.03 ft (0.619 m).

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1975, reached a gage height of 10.41 ft (3.173 m) Apr. 19, and a discharge of 2,640 ft³/s (74.8 m³/s) Apr. 20.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,390 ft³/s (39.4 m³/s) Mar. 15, gage height, 8.42 ft (2.566 m); minimum, 15 ft³/s (0.42 m³/s) Sept. 10, 11, 12, gage height, 2.24 ft (0.683 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	892	132	134	51	38	59	504	87	134	129	31	28
2	1160	118	130	52	36	53	500	82	221	94	29	20
3	994	106	125	54	39	52	450	77	235	77	28	19
4	838	96	115	60	42	50	400	74	249	81	28	18
5	728	95	106	100	42	45	370	70	244	80	28	17
6	660	105	97	124	40	55	330	67	229	69	27	18
7	609	106	93	117	38	60	290	71	204	58	26	18
8	522	102	92	100	37	55	270	86	168	50	25	18
9	447	95	87	90	37	53	250	93	116	45	24	18
10	379	86	74	80	37	55	260	86	78	42	23	17
11	315	79	70	70	37	60	270	74	64	45	22	16
12	258	74	67	64	38	106	290	66	55	45	22	16
13	197	70	64	60	39	538	340	70	50	43	21	17
14	142	68	64	58	40	1100	360	101	47	41	21	18
15	118	66	66	56	42	1350	330	108	45	45	21	24
16	106	65	64	54	44	1360	290	89	49	40	20	20
17	97	64	61	52	46	1340	260	70	53	43	20	20
18	104	64	60	49	48	1220	250	58	48	46	19	23
19	113	63	58	47	50	1080	240	52	54	44	18	22
20	106	81	56	46	52	946	220	50	67	40	20	21
21	100	118	54	45	54	844	200	47	78	36	19	20
22	114	129	52	44	57	746	180	47	87	34	19	20
23	127	122	50	44	60	668	170	51	78	33	20	21
24	129	111	50	43	62	611	150	54	63	31	20	22
25	125	99	50	43	59	563	140	52	54	29	21	22
26	119	98	50	43	56	510	130	50	48	28	22	21
27	117	172	49	42	58	458	120	49	46	29	21	32
28	138	202	49	41	60	411	108	57	47	53	20	40
29	153	181	49	41	---	369	100	63	102	50	20	36
30	154	154	50	41	---	348	92	58	148	40	21	30
31	145	---	50	40	---	448	---	54	---	34	21	---
TOTAL	10206	3121	2236	1851	1288	15613	7864	2113	3161	1554	697	644
MEAN	329	104	72.1	59.7	46.0	504	262	68.2	105	50.1	22.5	21.5
MAX	1160	202	134	124	62	1360	504	108	249	129	31	40
MIN	97	63	49	40	36	45	92	47	45	28	18	16
CFSM	2.02	.64	.44	.37	.28	3.09	1.61	.42	.64	.31	.14	.13
IN.	2.33	.71	.51	.42	.29	3.56	1.79	.48	.72	.35	.16	.15

CAL YR 1981 TOTAL 45028 MEAN 123 MAX 1160 MIN 13 CFSM .76 IN 10.28
WTR YR 1982 TOTAL 50348 MEAN 138 MAX 1360 MIN 16 CFSM .85 IN 11.49

STREAMS TRIBUTARY TO LAKE MICHIGAN

04111500 DEER CREEK NEAR DANSVILLE, MI

LOCATION.--Lat 42°36'30", long 84°19'15", in E½ sec.33, T.3 N., R.1 E., Ingham County, Hydrologic Unit 04050004, on right bank 15 ft (5 m) upstream from bridge on Clark Road, 3.5 mi (5.6 km) north of Dansville, and 7.2 mi (11.6 km) upstream from mouth.

DRAINAGE AREA.--16.3 mi² (42.2 km²).

PERIOD OF RECORD.--May 1954 to current year.

REVISED RECORDS.--WSP 1727: 1954(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 889.08 ft (270.992 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--28 years, 10.5 ft³/s (0.297 m³/s), 8.75 in/yr (222 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 962 ft³/s (27.2 m³/s) Apr. 19, 1975, gage height, 12.18 ft (3.712 m), from flood mark, rating curve extended above 610 ft³/s (17.3 m³/s); minimum, 0.04 ft³/s (0.001 m³/s) Sept. 8, 9, 12, 1978, gage height, 2.58 ft (0.786 m).

EXTREMES FOR CURRENT YEAR.--Peak discharge above base of 100 ft³/s (2.83 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	1400	210	5.95	5.99	1.826	Mar. 31	0700	188	5.32	5.65	1.722
Mar. 13	2100	*481	13.6	*8.83	2.691	June 1	1000	142	4.02	4.98	1.518
Mar. 16	2300	206	5.83	5.90	1.798						

Minimum discharge, 0.21 ft³/s (0.006 m³/s) Sept. 13, 14, gage height, 2.65 ft (0.808 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	173	9.6	13	5.6	2.5	4.7	75	6.4	114	6.0	1.3	.39
2	126	8.8	12	5.9	2.7	4.6	42	6.0	56	4.4	1.2	.43
3	58	8.1	11	6.2	2.9	4.0	39	5.7	25	6.5	1.2	.38
4	34	7.6	9.8	18	2.7	3.6	30	5.6	28	7.4	1.3	.35
5	25	7.6	9.1	21	2.5	3.3	22	5.3	15	5.4	1.1	.34
6	20	7.9	8.4	17	2.5	4.0	18	5.2	11	4.2	1.1	.33
7	17	7.3	8.5	14	2.5	4.8	26	6.5	8.8	3.6	.96	.39
8	14	6.8	7.9	11	2.5	4.0	28	8.4	8.1	2.7	.91	.37
9	12	6.2	6.8	9.0	2.5	3.5	23	6.6	6.6	2.4	.79	.33
10	10	5.7	6.4	8.5	2.5	3.5	31	5.8	6.1	2.2	.72	.30
11	8.9	5.5	5.2	6.5	2.5	10	35	5.2	4.9	2.3	.69	.29
12	7.8	5.1	5.0	5.5	2.5	35	39	5.1	4.3	2.0	.65	.27
13	7.0	5.0	5.0	5.0	2.5	335	55	5.9	3.8	1.6	.60	.22
14	6.5	5.0	5.2	4.5	2.5	340	35	5.2	3.3	1.6	.58	.28
15	6.2	4.8	5.2	4.2	2.5	219	26	4.5	3.8	1.8	.56	.41
16	6.0	4.8	4.9	3.8	2.6	176	22	4.3	4.5	1.4	.51	.46
17	6.3	4.7	4.5	3.6	2.7	172	25	3.9	4.0	2.5	.49	.51
18	8.5	4.6	4.4	3.4	2.7	114	22	3.5	3.5	2.8	.45	.83
19	9.3	4.6	4.0	3.4	2.7	91	18	3.2	6.7	2.2	.52	.66
20	7.0	9.3	3.9	3.3	2.8	74	17	3.1	7.2	2.0	.64	.63
21	7.4	12	4.2	3.2	3.0	77	15	2.9	15	1.7	.57	.62
22	11	10	4.1	3.1	3.5	59	13	3.1	8.7	1.5	.52	.78
23	11	9.1	4.4	3.1	4.0	54	11	4.2	6.0	1.5	.49	.94
24	10	8.6	4.2	3.1	5.0	53	10	3.8	4.6	1.3	.41	.91
25	9.4	7.8	4.2	3.0	5.0	44	9.4	3.7	3.9	1.1	.80	1.1
26	8.5	9.3	4.3	2.8	5.0	33	8.9	3.5	3.8	1.2	.55	1.2
27	9.9	31	4.7	2.8	4.8	27	8.1	3.8	3.7	1.5	.45	3.5
28	15	21	4.6	2.7	4.7	22	7.5	5.1	5.5	3.3	.44	5.5
29	13	16	4.5	2.7	---	22	7.0	4.2	25	2.3	.41	2.9
30	12	14	4.6	2.6	---	33	6.5	3.7	10	1.7	.49	1.9
31	11	---	4.9	2.5	---	158	---	4.4	---	1.4	.44	---
TOTAL	481.8	267.8	148.9	191.0	86.8	2148.0	716.4	147.8	484.8	83.3	21.84	27.52
MEAN	22.0	8.93	6.09	6.16	3.10	70.6	23.9	4.77	13.5	2.69	.70	.92
MAX	173	31	13	21	5.0	340	75	8.4	116	7.4	1.3	5.5
MIN	6.0	4.6	3.9	2.5	2.5	3.3	6.5	2.9	3.3	1.1	.41	.22
CFSM	1.35	.55	.37	.38	.19	4.33	1.47	.29	.83	.17	.04	.06
IN.	1.56	.61	.43	.44	.20	4.99	1.63	.34	.92	.19	.05	.06

CAL YR 1981 TOTAL 4474.80 MEAN 12.3 MAX 287 MIN .17 CFSM .76 IN 10.21
WTR YR 1982 TOTAL 5005.76 MEAN 13.7 MAX 340 MIN .22 CFSM .84 IN 11.42

04112000 SLOAN CREEK NEAR WILLIAMSTON, MI

LOCATION.--Lat 42°40'33", long 84°21'50", in SE¼ NE¼ sec.1, T.3 N., R.1 W., Ingham County, Hydrologic Unit 04050004, on left bank 30 ft (9 m) downstream from bridge on Meridian Road, 2.1 mi (3.4 km) upstream from mouth, and 4.2 mi (6.8 km) west of Williamston.

DRAINAGE AREA.--9.34 mi² (24.19 km²).

PERIOD OF RECORD.--June 1954 to current year.

GAGE.--Water-stage recorder and concrete control with V-notch sharp-crested weir. Datum of gage is 862.12 ft (262.774 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--28 years, 5.64 ft³/s (0.160 m³/s), 8.20 in/yr (208 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,290 ft³/s (36.5 m³/s) Apr. 18, 1975, gage height, 9.99 ft (3.045 m), from rating curve extended above 660 ft³/s (18.7 m³/s) on basis of computation of peak flow through culvert and over road embankment; minimum, 0.01 ft³/s (<0.001 m³/s) Sept. 11, 1954, Jan. 18, 1957, gage height, 1.10 ft (0.335 m), caused by unusual regulation; minimum natural discharge, 0.02 ft³/s (0.001 m³/s) July 27, 1965, gage height, 1.18 ft (0.360 m).

EXTREMES FOR CURRENT YEAR.--Peak discharge above base of 120 ft³/s (3.40 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	0430	*627	17.8	*7.05	2.149	Mar. 13	1800	423	12.0	5.83	1.777
Mar. 13	0600	343	9.71	5.33	1.625	Mar. 14	1700	205	5.81	4.45	1.356

Minimum discharge, 0.08 ft³/s (0.002 m³/s) Sept. 11, 12, 13, 14; minimum gage height, 1.30 ft (0.396 m) Sept. 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	298	4.9	7.4	2.2	1.2	2.3	33	2.7	54	1.2	1.5	.21
2	76	4.5	6.8	2.1	1.3	2.3	20	2.4	22	1.1	1.2	.18
3	44	4.1	6.0	2.3	1.3	1.8	18	2.2	9.7	2.3	1.0	.15
4	30	4.1	5.4	13	1.2	1.7	12	2.1	6.9	2.5	.91	.14
5	22	3.9	4.9	14	1.1	1.6	8.1	2.0	5.2	1.7	.76	.13
6	17	4.0	4.6	9.1	1.2	1.9	7.1	1.9	4.0	1.3	.67	.15
7	14	3.9	4.5	6.5	1.2	2.3	6.9	2.1	3.3	1.1	.57	.18
8	9.4	3.5	4.2	5.4	1.1	1.9	6.8	2.0	2.9	.91	.69	.16
9	7.3	3.3	3.7	4.3	1.2	1.7	9.2	1.7	2.5	.78	.66	.13
10	6.1	3.1	3.3	3.7	1.1	1.7	14	1.6	2.4	.72	.49	.10
11	5.4	2.9	3.0	2.7	1.1	4.7	18	1.5	1.9	.79	.43	.10
12	4.5	2.7	2.8	2.4	1.1	19	28	1.4	1.6	.68	.38	.09
13	4.0	2.6	2.7	2.5	1.1	300	38	1.5	1.5	.54	.34	.09
14	3.7	2.6	2.7	2.4	1.1	148	20	1.4	1.3	.58	.31	.17
15	3.6	2.5	2.7	2.2	1.2	105	13	1.3	1.5	.87	.30	.28
16	3.4	2.4	2.5	1.8	1.3	96	9.6	1.3	1.5	.69	.28	.22
17	3.2	2.3	2.4	1.6	1.3	85	9.3	1.2	1.3	1.2	.26	.21
18	7.8	2.2	2.2	1.7	1.3	58	7.9	1.1	1.2	1.1	.26	.42
19	7.5	2.2	2.0	1.6	1.3	47	6.7	1.1	2.4	.83	.26	.30
20	5.7	5.2	2.0	1.5	1.3	42	6.2	1.1	2.3	.71	.36	.22
21	5.1	7.2	1.9	1.4	1.4	43	5.3	1.0	3.4	.55	.32	.21
22	9.2	5.9	2.0	1.4	1.6	33	4.6	1.2	2.6	.50	.30	.25
23	7.9	5.1	2.0	1.7	2.2	30	4.3	1.2	2.0	.49	.30	.29
24	6.4	4.7	1.9	1.5	2.4	29	3.9	1.2	1.6	.42	.28	.26
25	5.6	4.3	1.7	1.3	2.4	24	3.7	1.1	1.4	.36	.34	.50
26	4.9	6.3	1.8	1.2	2.3	17	3.4	1.1	1.4	.42	.26	.43
27	5.8	42	2.0	1.2	2.2	11	3.1	1.2	1.3	2.0	.26	2.4
28	8.4	19	1.9	1.3	2.2	9.2	2.8	1.3	1.6	32	.26	3.0
29	7.1	12	1.8	1.2	---	8.3	2.7	1.1	2.8	9.3	.28	1.4
30	6.1	8.3	1.6	1.2	---	16	2.7	1.1	1.6	3.9	.29	.90
31	5.3	---	1.8	1.0	---	71	---	1.4	---	2.3	.23	---
TOTAL	644.4	181.7	96.2	97.4	40.7	1235.4	328.3	46.5	149.1	73.84	14.75	13.36
MEAN	20.8	6.06	3.10	3.14	1.45	39.9	10.9	1.50	4.97	2.38	.48	.45
MAX	298	42	7.4	14	2.4	300	38	2.7	54	32	1.5	3.0
MIN	3.2	2.2	1.6	1.0	1.1	1.6	2.7	1.0	1.2	.36	.23	.09
CFSM	2.23	.65	.33	.34	.16	4.27	1.17	.16	.53	.26	.05	.05
IN.	2.57	.72	.38	.39	.16	4.92	1.31	.19	.59	.29	.06	.05

CAL YR 1981 TOTAL 2767.50 MEAN 7.53 MAX 298 MIN .16 CFSM .81 IN 10.94
WTR YR 1982 TOTAL 2921.65 MEAN 8.00 MAX 300 MIN .09 CFSM .86 IN 11.64

04112500 RED CEDAR RIVER AT EAST LANSING, MI

LOCATION.--Lat 42°43'40", long 84°28'40", in SW¼ sec.18, T.4 N., R.1 W., Ingham County, Hydrologic Unit 04050004, in left downstream bridge abutment of Farm Lane Bridge on Michigan State University Campus in East Lansing, 4.0 mi (6.4 km) upstream from Sycamore Creek, and 5.6 mi (9.0 km) upstream from mouth.

DRAINAGE AREA.--355 mi² (919 km²).

PERIOD OF RECORD.--August 1902 to December 1903, March 1931 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as Red Cedar River at Agricultural College, August 1902 to December 1903 and as Cedar River at East Lansing, March 1931 to September 1965. Gage height records collected in this vicinity 1911-19, and for flood seasons only 1920-28, are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1307: 1936(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 824.39 ft (251.274 m) National Geodetic Vertical Datum of 1929. August 1902 to December 1903 nonrecording gage at site 0.8 mi (1.3 km) downstream at different datum. March 1931 to November 1940 water-stage recorder at site 250 ft (76 m) upstream at present datum.

REMARKS.--Records good except those for the winter period, which are fair. Prior to April 1975, occasional regulation at low flow by mill at Williamston, 16 mi (26 km) above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--52 years, 205 ft³/s (5.806 m³/s), 7.84 in/yr (199 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,940 ft³/s (168 m³/s) Apr. 20, 1975, gage height, 11.95 ft (3.642 m); minimum, 3 ft³/s (0.08 m³/s) July 31, 1931.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Mar. 24, 1904, reached a stage of 13.4 ft (4.08 m), discharge, 8,000 ft³/s (277 m³/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,640 ft³/s (103 m³/s) Mar. 16, gage height, 9.23 ft (2.813 m); minimum, 23 ft³/s (0.65 m³/s) Sept. 13, 14, gage height, 3.13 ft (0.954 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1250	226	268	114	72	120	1140	184	395	226	67	34
2	2180	208	254	111	69	120	1080	180	570	177	60	32
3	2060	202	250	111	74	114	960	170	431	170	55	31
4	1640	191	236	152	79	102	880	163	355	163	55	29
5	1260	184	226	222	80	84	805	160	335	149	55	29
6	1040	194	208	287	78	111	675	152	303	132	53	31
7	920	212	194	275	74	117	595	156	272	114	51	29
8	795	219	191	198	72	111	575	177	247	95	51	29
9	665	216	184	174	70	105	540	184	216	82	49	28
10	550	208	174	160	70	102	570	184	174	77	44	26
11	458	198	114	132	71	123	595	170	138	89	42	26
12	387	191	149	126	72	174	625	160	120	77	40	24
13	327	189	142	120	74	760	735	156	105	72	38	23
14	268	174	132	114	78	1820	790	163	97	67	38	34
15	226	163	132	108	82	2880	705	174	105	74	36	38
16	202	160	132	105	88	3480	605	166	111	74	36	40
17	184	160	129	100	90	3340	550	149	105	100	34	38
18	205	160	84	95	94	2800	545	126	100	95	31	55
19	226	156	89	89	97	2320	500	111	123	84	31	44
20	219	184	111	89	100	1990	458	111	132	77	40	42
21	208	230	105	89	102	1750	427	102	138	67	34	38
22	230	236	100	87	111	1540	391	114	166	62	31	40
23	250	230	105	85	117	1370	355	114	152	60	31	42
24	247	219	102	85	123	1230	323	114	129	55	31	42
25	236	210	100	82	117	1110	287	114	111	53	42	65
26	226	225	102	84	108	990	254	111	97	53	34	49
27	222	250	105	79	114	855	233	120	89	51	34	105
28	247	330	108	79	117	720	216	120	100	163	34	129
29	268	318	108	79	---	630	202	120	146	156	32	100
30	261	287	105	79	---	595	191	117	258	100	36	74
31	244	---	102	79	---	870	---	111	---	77	34	---
TOTAL	17701	6313	4541	3789	2493	32433	16807	4453	5820	3091	1279	1346
MEAN	571	210	146	122	89.0	1046	560	144	194	99.7	41.3	44.9
MAX	2180	330	268	287	123	3480	1140	184	570	226	67	129
MIN	184	156	84	79	69	84	191	102	89	51	31	23
CFSM	1.61	.59	.41	.34	.25	2.95	1.58	.41	.55	.28	.12	.13
IN.	1.85	.66	.48	.40	.26	3.40	1.76	.47	.61	.32	.13	.14

CAL YR 1981 TOTAL 90351 MEAN 248 MAX 2480 MIN 21 CFSM .70 IN 9.47
WTR YR 1982 TOTAL 100866 MEAN 274 MAX 3480 MIN 23 CFSM .77 IN 10.49

04113000 GRAND RIVER AT LANSING, MI

LOCATION.--Lat 42°45'02", long 84°33'19", in NW¼ sec.9, T.4 N., R.2 W., Ingham County, Hydrologic Unit 04050004, on right bank 30 ft (9 m) upstream from bridge on North Grand River Avenue in Lansing, 2.0 mi (3.2 km) downstream from Red Cedar River, and at mile 152 (245 km).

DRAINAGE AREA.--1,230 mi² (3,190 km²), approximately.

PERIOD OF RECORD.--March 1901 to September 1906, October 1934 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "at North Lansing" 1901-6. Gage-height records collected in this vicinity 1907-10 (flood seasons only), 1911-19, 1920-28 (flood seasons only), and since 1931 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1174: 1949. WSP 1387: 1901, 1903-4, 1935, 1937, 1942.

GAGE.--Water-stage recorder. Datum of gage is 805.53 ft (245.526 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to August 1906, nonrecording gage at same site at different datum. November 1934 to June 1949 water-stage recorder at site 1.8 mi (2.9 km) downstream at datum 2.42 ft (0.738 m) lower.

REMARKS.--Records good. Large diurnal fluctuation at medium and low flows caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--53 years, 831 ft³/s (23.53 m³/s), 9.17 in/yr (233 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 24,500 ft³/s (694 m³/s) Mar. 26, 1904, gage height, 18.60 ft (5.669 m), datum then in use, from rating curve extended above 15,000 ft³/s (425 m³/s); minimum, 2.8 ft³/s (0.079 m³/s) Sept. 9, 1963, gage height, 0.85 ft (0.259 m); minimum daily, 20 ft³/s (0.57 m³/s) Aug. 25, 1941.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1901, that of Mar. 26, 1904.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 8,800 ft³/s (249 m³/s) Mar. 17, gage height, 13.40 ft (4.084 m); minimum, 39 ft³/s (1.10 m³/s) Sept. 24, gage height, 1.55 ft (0.472 m); minimum daily, 115 ft³/s (3.26 m³/s) Sept. 9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3500	1060	1030	587	457	660	4100	1120	1560	898	485	194
2	3800	1050	961	505	430	680	4200	1050	1910	728	317	191
3	3920	1040	951	571	383	740	4050	1080	1720	728	377	203
4	3390	984	898	795	470	680	3610	1010	1640	710	297	244
5	2860	933	864	832	491	660	3260	985	1410	723	306	142
6	2570	913	740	1030	461	630	3050	925	1410	705	306	286
7	2120	921	784	972	430	540	2720	930	1230	615	327	194
8	1980	899	829	814	418	600	2660	889	1110	494	409	171
9	1720	933	690	647	445	680	2560	887	1050	525	307	115
10	1540	878	683	614	422	698	2600	911	998	543	283	233
11	1290	814	591	471	431	793	2720	867	876	614	223	190
12	1260	759	752	528	454	1010	2710	877	777	396	207	129
13	1150	700	617	637	430	3080	2880	872	782	440	290	214
14	1070	688	611	553	469	5200	2930	845	633	408	183	259
15	983	599	569	587	551	6890	2720	878	718	400	253	304
16	887	661	581	577	550	7920	2510	876	592	465	221	165
17	936	676	553	483	533	8580	2300	802	620	770	194	283
18	822	649	422	471	574	7920	2200	742	615	650	205	389
19	967	654	457	512	602	7000	2180	703	732	486	224	252
20	929	899	431	493	620	6290	2100	766	772	638	317	358
21	873	1000	423	484	640	5650	2060	534	854	447	193	366
22	925	952	506	522	660	5110	1930	609	934	454	180	200
23	945	943	580	469	660	4730	1830	636	854	535	231	328
24	921	982	455	466	700	4440	1680	693	813	366	192	269
25	988	872	410	441	680	4150	1580	633	750	400	340	280
26	967	903	516	436	680	3940	1510	646	651	310	192	361
27	957	1130	469	425	680	3550	1420	794	606	339	257	557
28	1050	1360	503	420	650	3210	1340	773	610	613	161	503
29	1040	1210	537	434	---	2930	1280	832	844	503	301	520
30	1100	1080	487	424	---	2890	1240	816	916	592	250	534
31	1090	---	495	467	---	3330	---	883	---	360	191	---
TOTAL	48550	27142	19395	17667	14971	105181	73930	25864	28987	16855	8139	8534
MEAN	1566	905	626	570	535	3393	2464	834	966	544	263	284
MAX	3920	1360	1030	1030	700	8580	4200	1120	1910	898	409	583
MIN	822	599	410	420	383	540	1240	534	592	310	161	115
CFSM	1.27	.74	.51	.46	.44	2.76	2.00	.68	.79	.44	.21	.23
IN.	1.47	.82	.59	.53	.45	3.18	2.24	.78	.88	.51	.25	.26

CAL YR 1981 TOTAL 369179 MEAN 1011 MAX 6130 MIN 155 CFSM .82 IN 11.17
WTR YR 1982 TOTAL 395215 MEAN 1083 MAX 8580 MIN 115 CFSM .88 IN 11.95

04114000 GRAND RIVER AT PORTLAND, MI

LOCATION.--Lat 42°51'20", long 84°54'45", in NW¼ sec.4, T.5 N., R.5 W., Ionia County, Hydrologic Unit 04050004, on left bank at downstream side of bridge on Kent Street, 1.0 mi (1.6 km) south of Portland, 1.9 mi (3.1 km) upstream from Looking Glass River, and at mile 115 (185 km).

DRAINAGE AREA.--1,385 mi² (3,587 km²).

PERIOD OF RECORD.--August 1952 to March 1982 (discontinued). Gage-height records for flood seasons collected in this vicinity 1907-28 are contained in reports of U.S. Weather Bureau.

GAGE.--Water-stage recorder. Datum of gage is 705.00 ft (214.884 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to July 6, 1953, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Slight diurnal fluctuation caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--29 years (water years 1953-81), 909 ft³/s (25.74 m³/s), 8.91 in/yr (226 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,400 ft³/s (351 m³/s) Apr. 21, 1975, gage height, 12.98 ft (3.956 m); minimum, 38 ft³/s (1.08 m³/s) Oct. 10, 1963; minimum daily, 58 ft³/s (1.64 m³/s) Oct. 9, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge during period October 1981 to March 1982, 9,840 ft³/s (279 m³/s) Mar. 17, gage height, 12.05 ft (3.673 m); minimum daily, 450 ft³/s (12.7 m³/s) Feb. 3; minimum gage height, 5.05 ft (1.539 m) Dec. 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3900	1090	1180	598	520	746						
2	4390	1080	1140	699	500	830						
3	4450	1080	1050	604	450	773						
4	4070	1020	1060	839	460	727						
5	3510	981	981	1050	530	725						
6	3010	936	945	1090	540	568						
7	2630	886	793	1190	520	640						
8	2230	884	908	1110	490	756						
9	2040	905	894	900	490	787						
10	1780	917	744	800	490	700						
11	1620	856	755	650	490	777						
12	1310	827	690	550	500	1080						
13	1300	764	817	600	500	3800						
14	1180	703	679	700	520	6140						
15	1130	698	704	660	560	7670						
16	1020	627	654	660	610	8560						
17	955	686	663	640	610	9690						
18	1010	687	625	600	620	9350						
19	897	675	529	560	650	8280						
20	1070	822	549	560	690	7240						
21	951	1050	555	560	720	6540						
22	1020	1100	521	560	732	5940						
23	1010	981	603	550	766	5490						
24	1010	1040	653	540	746	5150						
25	988	1030	572	520	742	4840						
26	1030	942	521	510	757	4520						
27	1000	1100	624	500	701	4190						
28	1000	1340	563	490	732	3750						
29	1080	1420	593	490	---	3400						
30	1060	1280	633	490	---	3220						
31	1110	---	629	500	---	4110						
TOTAL	54761	28407	22827	20770	16636	120989	---	---	---	---	---	---
MEAN	1766	947	736	670	594	3903	---	---	---	---	---	---
MAX	4450	1420	1180	1190	766	9690	---	---	---	---	---	---
MIN	897	627	521	490	450	568	---	---	---	---	---	---
CFSM	1.28	.68	.53	.48	.43	2.82	---	---	---	---	---	---
IN.	1.47	.76	.61	.56	.45	3.25	---	---	---	---	---	---

CAL YR 1981 TOTAL 421291 MEAN 1154 MAX 6540 MIN 236 CFSM .83 IN 11.32

04114500 LOOKING GLASS RIVER NEAR EAGLE, MI

LOCATION.--Lat 42°49'45", long 84°46'40", in sec.10, T.5 N., R.4 W., Clinton County, Hydrologic Unit 04050004, on right bank at upstream side of former bridge site, 1.5 mi (2.4 km) northeast of Eagle and 10 mi (16 km) upstream from mouth.

DRAINAGE AREA.--281 mi² (728 km²).

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1387: 1946-47.

GAGE.--Water-stage recorder. Datum of gage is 747.09 ft (227.713 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to June 2, 1962, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Small intermittent diversion at times into Lake Geneva when discharge is above 50 ft³/s (1.42 m³/s). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--38 years, 171 ft³/s (4.843 m³/s), 8.26 in/yr (210 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,860 ft³/s (81.0 m³/s) Apr. 5, 1947, gage height, 7.70 ft (2.347 m), from graph based on gage readings, from rating curve extended above 1,900 ft³/s (53.8 m³/s); maximum gage height, 9.9 ft (3.02 m) Mar. 7, 1956, from high-water mark, backwater from ice; minimum discharge, 10 ft³/s (0.28 m³/s) July 28, 1965, gage height, 1.01 ft (0.308 m).

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 2,000 ft³/s (56.6 m³/s) Mar. 13; maximum gage height, 8.43 ft (2.569 m) Mar. 13, backwater from ice; minimum discharge, 29 ft³/s (0.82 m³/s) Sept. 13, 14, gage height, 1.36 ft (0.415 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1450	221	191	110	69	100	912	173	134	92	81	38
2	826	213	198	110	68	105	754	157	162	99	75	37
3	495	207	200	120	68	100	702	146	148	113	66	35
4	434	202	198	130	67	90	638	136	151	127	61	34
5	445	198	194	180	66	80	593	130	158	130	55	33
6	501	193	189	250	66	90	559	125	166	124	52	33
7	573	186	184	210	65	100	538	123	167	114	50	34
8	658	180	179	190	64	96	513	122	158	98	50	33
9	734	172	171	170	64	90	500	119	140	85	48	33
10	780	165	165	150	63	94	493	118	127	76	47	32
11	807	161	155	130	63	114	472	117	111	74	43	32
12	802	157	146	110	64	150	457	113	101	71	41	31
13	776	153	140	100	66	2000	467	114	92	66	39	30
14	737	148	135	95	68	1800	439	113	83	64	36	43
15	692	143	128	90	72	1070	417	108	82	65	36	63
16	631	138	123	88	74	919	406	104	99	62	35	64
17	577	134	121	85	78	1030	483	101	96	88	34	54
18	541	131	115	82	82	1070	397	98	94	90	33	70
19	495	128	115	80	86	1170	390	92	166	91	32	67
20	449	159	110	78	90	1290	389	90	153	90	35	66
21	410	159	105	77	92	1390	371	84	141	84	32	63
22	393	151	105	76	98	1440	350	87	132	77	31	60
23	363	150	105	75	100	1440	330	93	125	70	33	58
24	333	153	100	74	105	1410	310	91	117	64	32	55
25	310	159	100	73	100	1340	291	89	106	58	47	53
26	292	171	100	72	95	1250	273	88	96	58	41	54
27	278	202	100	71	100	1130	251	89	87	58	41	63
28	264	199	100	71	100	1040	226	96	86	71	41	76
29	252	192	100	70	---	955	206	94	95	72	40	85
30	241	188	100	70	---	937	188	99	97	78	41	87
31	230	---	105	70	---	1200	---	90	---	80	39	---
TOTAL	16778	5113	4277	3357	2193	25090	13235	3399	3670	2589	1367	1516
MEAN	541	170	138	108	78.3	809	441	110	122	83.5	44.1	50.5
MAX	1450	221	200	250	105	2000	912	173	167	130	81	87
MIN	230	128	100	70	63	80	188	84	82	58	31	30
CFSM	1.93	.61	.49	.38	.28	2.88	1.57	.39	.43	.30	.16	.18
IN.	2.22	.68	.57	.44	.29	3.32	1.75	.45	.49	.34	.18	.20

CAL YR 1981 TOTAL 81512 MEAN 223 MAX 1450 MIN 27 CFSM .79 IN 10.79
WTR YR 1982 TOTAL 82584 MEAN 226 MAX 2000 MIN 30 CFSM .80 IN 10.93

04115000 MAPLE RIVER AT MAPLE RAPIDS, MI

LOCATION.--Lat 43°06'35", long 84°41'35", in sec.5, T.8 N., R.3 W., Clinton County, Hydrologic Unit 04050005, on right bank at downstream side of bridge on Maple Road at Maple Rapids, 50 ft (15 m) upstream from Pine Creek, and 0.8 mi (1.3 km) upstream from Hayworth Creek. Records include flow of Pine Creek.

DRAINAGE AREA.--434 mi² (1,124 km²).

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1707: 1956.

GAGE.--Water-stage recorder. Datum of gage is 642.58 ft (195.858 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Oct. 4, 1968, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--38 years, 253 ft³/s (7.165 m³/s), 7.92 in/yr (201 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 6,500 ft³/s (184 m³/s) Mar. 20, 1948; maximum gage height, 11.22 ft (3.420 m) Mar. 20, 1948, from floodmark, backwater from ice; minimum discharge, 4.4 ft³/s (0.12 m³/s) Aug. 13, 1965, gage height, 1.62 ft (0.494 m).

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in March 1904 reached a stage of 13.8 ft (4.21 m), from information by local resident.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,280 ft³/s (121 m³/s) Mar. 17, gage height, 9.86 ft (3.005 m); maximum gage height, 11.05 ft (3.368 m) Oct. 2; minimum discharge, 24 ft³/s (0.68 m³/s) Aug. 19, gage height, 1.89 ft (0.576 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1600	317	495	104	78	110	1030	215	175	82	196	53
2	3000	296	472	117	76	110	1150	194	262	72	171	50
3	3300	276	452	102	74	110	1100	169	262	67	156	47
4	3500	258	427	143	74	105	1100	144	245	66	136	45
5	3200	242	400	226	73	105	1080	131	223	60	111	40
6	3090	230	376	271	72	100	968	127	193	56	87	40
7	2740	219	354	296	72	100	860	131	162	52	71	38
8	2240	209	332	290	71	100	782	136	138	51	63	35
9	1810	201	310	240	70	88	728	136	120	47	62	34
10	1460	188	283	200	71	97	712	129	114	43	62	33
11	1200	178	254	170	71	100	710	110	115	40	55	32
12	1080	167	238	150	72	120	712	105	106	46	49	32
13	1010	155	222	135	72	854	712	99	98	48	44	30
14	948	145	206	125	74	2430	722	95	88	44	41	29
15	896	137	191	120	76	3310	710	95	86	39	39	36
16	848	132	177	110	78	3910	682	92	92	35	37	41
17	767	127	160	105	80	4240	640	88	98	42	35	39
18	706	124	148	100	82	3920	605	82	98	52	32	41
19	684	125	131	95	85	3410	568	82	106	58	28	47
20	662	139	122	90	88	2910	530	84	137	55	38	48
21	620	168	121	88	90	2400	494	78	167	49	40	47
22	576	185	113	85	96	2010	464	78	170	45	38	47
23	550	198	115	85	100	1710	416	84	154	41	36	45
24	547	205	114	84	105	1480	392	88	133	38	34	45
25	509	205	107	84	110	1310	366	88	116	35	99	46
26	472	207	100	82	110	1170	341	86	106	40	164	47
27	435	308	112	81	110	1050	316	85	96	111	142	46
28	407	433	109	80	110	927	287	85	98	259	105	45
29	389	495	108	80	---	826	262	89	98	279	79	47
30	363	506	107	78	---	749	237	85	90	262	69	52
31	339	---	103	78	---	848	---	98	---	231	60	---
TOTAL	39948	6775	6959	4094	2340	40709	19676	3388	4146	2445	2379	1257
MEAN	1289	226	224	132	83.6	1313	656	109	138	78.9	76.7	41.9
MAX	3500	506	495	296	110	4240	1150	215	262	279	196	53
MIN	339	124	100	78	70	88	237	78	86	35	28	29
CFSM	2.97	.52	.52	.30	.19	3.03	1.51	.25	.32	.18	.18	.10
IN.	3.42	.58	.60	.35	.20	3.49	1.69	.29	.36	.21	.20	.11

CAL YR 1981 TOTAL 143588 MEAN 393 MAX 3500 MIN 14 CFSM .91 IN 12.31
WTR YR 1982 TOTAL 134116 MEAN 367 MAX 4240 MIN 28 CFSM .85 IN 11.50

04116000 GRAND RIVER AT IONIA, MI

LOCATION.--Lat 42°58'20", long 85°04'13", in NW¼ sec.30, T.7 N., R.6 W., Ionia County, Hydrologic Unit 04050006, on left bank 15 ft (5 m) downstream from bridge on State Highway 66 at Ionia, 2.7 mi (4.3 km) downstream from Prairie Creek, and at mile 87 (140 km).

DRAINAGE AREA.--2,840 mi² (7,360 km²), approximately.

PERIOD OF RECORD.--March to June 1931, July and September 1931 (fragmentary), July 1951 to current year. Gage-height records for flood seasons collected in this vicinity 1907-28 are contained in reports of U.S. Weather Bureau.

GAGE.--Water-stage recorder. Datum of gage is 615.38 ft (187.568 m) National Geodetic Vertical Datum of 1929. Mar. 19 to Sept. 24, 1931, nonrecording gage at site 1.5 mi (2.4 km) upstream at different datum.

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation below about 5,000 ft³/s (142 m³/s) caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--31 years (water years 1952-82), 1,879 ft³/s (53.21 m³/s), 8.98 in/yr (228 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 21,500 ft³/s (609 m³/s) Apr. 1, 1960, gage height, 23.43 ft (7.141 m); minimum, 40 ft³/s (1.13 m³/s) May 13, 1968, gage height, 5.61 ft (1.710 m); minimum daily, 109 ft³/s (3.09 m³/s) July 16, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 17,500 ft³/s (496 m³/s) Oct. 3, gage height, 23.18 ft (7.065 m); minimum, 312 ft³/s (8.84 m³/s) Aug. 18, 19, gage height, 7.03 ft (2.143 m); minimum daily, 446 ft³/s (12.6 m³/s) Sept. 13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7570	2130	2760	1250	1050	1550	7890	2250	2130	1540	1310	587
2	14000	2130	2660	1630	1050	1550	8000	2190	2950	1400	1090	564
3	17300	2050	2630	1530	1000	1550	7940	1830	3280	1330	1040	556
4	15800	2050	2580	1510	1000	1500	7740	1870	3120	1220	953	538
5	13300	2110	2360	2100	1000	1500	7200	1790	2850	1220	1050	584
6	11100	1940	2390	2130	1000	1500	6480	1660	2560	1280	745	532
7	9550	1810	2230	2350	1000	1500	6000	1600	2320	1190	943	512
8	8240	1760	1630	2100	1050	1500	5650	1610	2290	1120	758	683
9	7380	1750	1730	1800	1050	1500	5380	1570	2050	1038	1020	527
10	6690	1760	1950	1600	1050	1550	5240	1520	1890	903	936	492
11	5880	1710	1780	1400	1050	1600	5260	1500	1990	870	597	471
12	5160	1660	1740	1300	1050	2600	5340	1530	1650	1050	561	463
13	4470	1540	1660	1250	1100	6750	5430	1450	1440	1120	810	446
14	4140	1530	1730	1200	1100	13200	5610	1410	1370	651	513	478
15	3930	1450	1490	1200	1150	17200	5400	1440	1260	799	497	529
16	3630	1300	1500	1200	1200	18200	5230	1390	1300	771	614	843
17	3240	1290	1440	1200	1250	18000	4920	1350	1450	1180	485	846
18	3040	1270	1340	1200	1300	18000	4410	1330	1220	1730	460	548
19	3090	1330	1260	1200	1350	17000	4250	1260	1390	2030	465	689
20	3000	1490	1120	1200	1350	15300	4130	1190	1980	1060	516	883
21	2840	1850	1210	1150	1400	13500	4020	1430	1688	1090	800	557
22	2820	2100	1200	1150	1450	12100	3820	1090	1570	1070	496	830
23	2770	1840	1240	1150	1450	10900	3620	1160	1660	870	499	909
24	2680	2050	1390	1150	1500	9960	3360	1540	1640	848	735	569
25	2600	2070	1520	1150	1500	9300	3170	1480	1560	849	672	568
26	2320	1670	1000	1100	1500	8620	2950	1030	1350	810	876	818
27	2430	2070	1060	1100	1550	8020	2870	1070	1280	946	885	515
28	2420	2780	1230	1050	1550	7310	2810	1470	1210	1230	778	966
29	2390	2780	1110	1050	---	6640	2260	1510	1400	1310	713	993
30	2250	2880	1090	1050	---	6120	2380	1570	1580	1340	953	973
31	2300	---	1160	1050	---	6780	---	1760	---	1250	611	---
TOTAL	179130	56150	51190	42500	34050	242300	148760	46850	55420	35107	23381	19478
MEAN	5778	1872	1651	1371	1216	7816	4959	1511	1847	1132	754	649
MAX	17300	2880	2760	2350	1550	18200	8000	2250	3280	2030	1310	993
MIN	2250	1270	1000	1050	1000	1500	2260	1030	1210	651	460	446
CFSM	2.04	.66	.58	.48	.43	2.75	1.75	.53	.65	.40	.27	.23
IN.	2.35	.74	.67	.56	.45	3.17	1.95	.61	.73	.46	.31	.26

CAL YR 1981 TOTAL 909637 MEAN 2492 MAX 17300 MIN 379 CFSM .88 IN 11.91
WTR YR 1982 TOTAL 934316 MEAN 2560 MAX 18200 MIN 446 CFSM .90 IN 12.24

04116500 FLAT RIVER AT SMYRNA, MI

LOCATION.--Lat 43°03'10", long 85°15'50", in NW¼ sec.28, T.8 N., R.8 W., Ionia County, Hydrologic Unit 04050006, on right bank at downstream side of highway bridge, and 0.5 mi (0.8 km) south of Smyrna.

DRAINAGE AREA.--528 mi² (1,368 km²).

PERIOD OF RECORD.--October 1950 to current year. Monthly discharge only for some periods, published in WSP 1727.

GAGE.--Water-stage recorder. Datum of gage is 729.53 ft (222.361 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, June 14 to July 14, which are fair. Diurnal fluctuation caused by powerplants above station prior to September 1956; occasional diurnal fluctuation since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--32 years, 430 ft³/s (12.18 m³/s), 11.06 in/yr (281 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,100 ft³/s (87.8 m³/s) Apr. 22, 1967, gage height, 7.27 ft (2.216 m), caused by momentary release of water from storage above station; maximum gage height, 8.26 ft (2.518 m) Feb. 6, 1974, backwater from ice; minimum discharge, 7.4 ft³/s (0.21 m³/s) Sept. 9, 1953; minimum daily, 70 ft³/s (1.98 m³/s) Sept. 6, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,220 ft³/s (62.9 m³/s) Oct. 2, gage height, 6.72 ft (2.048 m); minimum, 149 ft³/s (4.22 m³/s) July 15; minimum gage height, 3.23 ft (0.985 m) Mar. 5.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1840	484	721	348	280	309	971	477	816	280	397	278
2	2000	475	742	261	280	369	954	459	811	270	397	326
3	1780	442	769	344	280	334	955	444	733	260	385	312
4	1740	428	764	510	280	290	981	386	624	260	381	294
5	1630	424	721	500	280	238	975	413	574	250	376	286
6	1410	419	677	515	280	414	885	406	515	250	340	286
7	1300	419	630	428	290	405	916	413	412	240	332	279
8	1150	406	610	332	290	341	900	415	406	240	332	274
9	1080	411	589	320	290	359	861	406	395	230	332	213
10	968	406	555	320	300	365	839	374	387	230	324	164
11	918	389	455	320	300	374	828	351	419	250	284	244
12	869	389	499	320	300	406	827	353	444	270	261	253
13	732	381	465	310	310	799	850	348	452	270	207	248
14	715	368	442	310	320	1030	861	334	430	210	200	255
15	704	364	433	300	320	1260	855	321	420	150	197	309
16	646	360	419	290	330	1370	848	321	410	180	200	303
17	550	340	406	290	340	1590	902	319	410	446	200	320
18	625	344	336	290	350	1730	892	306	420	535	228	520
19	748	348	328	280	360	1760	881	303	460	550	221	464
20	630	397	364	280	370	1670	878	298	450	594	265	409
21	693	465	348	280	380	1530	852	286	430	589	250	347
22	759	489	402	280	407	1490	819	302	400	565	218	383
23	699	550	402	280	410	1360	800	346	370	535	218	378
24	615	480	368	280	396	1270	750	376	350	470	246	362
25	615	509	340	280	362	1210	700	365	330	424	419	304
26	610	428	372	280	335	1150	650	348	330	336	360	308
27	599	620	360	280	371	1080	600	342	320	428	320	359
28	599	620	356	280	403	1020	560	324	310	693	277	353
29	579	667	356	280	---	946	530	333	300	514	268	242
30	545	688	344	280	---	907	505	571	290	372	303	251
31	489	---	316	280	---	983	---	556	---	402	293	---
TOTAL	28837	13510	14889	9948	9214	28449	24625	11596	13418	11293	9031	9324
MEAN	930	450	480	321	329	918	821	374	447	364	291	311
MAX	2000	688	769	515	410	1760	981	571	816	693	419	520
MIN	489	340	316	261	280	238	505	286	290	150	197	164
CFSM	1.76	.85	.91	.61	.62	1.74	1.56	.71	.85	.69	.55	.59
IN.	2.03	.95	1.05	.70	.65	2.00	1.73	.82	.95	.80	.64	.66

CAL YR 1981 TOTAL 167620 MEAN 459 MAX 2000 MIN 134 CFSM .87 IN 11.81
WTR YR 1982 TOTAL 184134 MEAN 504 MAX 2000 MIN 150 CFSM .96 IN 12.97

04117500 THORNAPPLE RIVER NEAR HASTINGS, MI

LOCATION.--Lat 42°36'57", long 85°14'11", in SE¼ sec.27, T.3 N., R.8 W., Barry County, Hydrologic Unit 04050007, on downstream side of highway bridge, 0.6 mi (1.0 km) downstream from Cedar Creek, 2.0 mi (3.2 km) downstream from Thornapple Lake, and 3.2 mi (5.1 km) southeast of Hastings.

DRAINAGE AREA.--385 mi² (997 km²).

PERIOD OF RECORD.--October 1944 to current year.

GAGE.--Water-stage recorder. Datum of gage is 786.71 ft (239.789 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Oct. 1, 1965, nonrecording gage at same site and datum.

REMARKS.--Records good. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--38 years, 312 ft³/s (8.836 m³/s), 11.01 in/yr (280 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,810 ft³/s (193 m³/s) Apr. 7, 1947, gage height, 10.20 ft (3.109 m), from graph based on gage readings; minimum, 33 ft³/s (0.93 m³/s) Aug. 10, 1964, gage height, 2.71 ft (0.826 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,180 ft³/s (118 m³/s) Mar. 16, gage height, 9.00 ft (2.743 m); minimum, 96 ft³/s (2.72 m³/s) Sept. 13, 14, gage height, 2.92 ft (0.890 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	508	246	332	183	175	247	1070	259	500	456	163	116
2	750	238	319	165	175	245	1180	252	679	424	160	116
3	920	230	311	179	174	222	1180	246	729	370	157	114
4	944	224	298	243	180	197	1150	235	645	370	157	114
5	885	217	281	357	180	179	1060	228	515	361	154	109
6	802	219	268	441	180	222	909	225	405	322	152	109
7	702	216	254	432	180	239	800	234	330	272	146	105
8	592	211	246	353	179	223	712	248	280	238	141	105
9	492	204	239	298	177	218	656	249	264	210	138	103
10	414	196	224	270	180	218	644	235	276	188	133	103
11	355	191	201	249	180	235	679	222	272	184	128	101
12	311	188	198	246	174	317	731	214	245	197	123	101
13	276	184	196	251	175	805	795	229	217	200	118	98
14	253	182	194	250	176	2110	867	237	200	188	118	98
15	247	181	194	241	180	3480	878	218	200	181	116	114
16	243	181	194	231	194	4120	832	211	261	178	114	118
17	234	180	192	231	209	4090	753	217	280	217	112	118
18	251	181	171	213	214	3700	661	206	257	335	107	137
19	307	186	166	197	217	3170	583	204	280	485	105	147
20	338	212	169	195	230	2690	521	209	343	540	109	146
21	343	268	159	188	226	2270	477	210	370	466	109	142
22	347	310	167	196	229	1950	437	228	343	365	107	145
23	365	316	172	186	239	1680	394	272	301	288	109	144
24	379	293	157	190	250	1470	363	284	257	245	109	142
25	374	271	147	189	234	1320	344	268	221	214	136	137
26	349	256	169	188	220	1180	326	242	217	194	141	133
27	324	293	178	186	229	1040	310	245	210	191	136	129
28	303	355	181	184	238	894	292	326	207	224	128	129
29	285	378	178	184	---	774	277	370	330	221	123	129
30	268	361	164	179	---	694	263	357	433	197	121	135
31	256	---	166	180	---	831	---	348	---	178	118	---
TOTAL	13417	7168	6485	7275	5594	41030	20144	7728	10067	8699	3988	3637
MEAN	433	239	209	235	200	1324	671	249	336	281	129	121
MAX	944	378	332	441	250	4120	1180	370	729	540	163	147
MIN	234	180	147	165	174	179	263	204	200	178	105	98
CFSM	1.13	.62	.54	.61	.52	3.44	1.74	.65	.87	.73	.34	.31
IN.	1.30	.69	.63	.70	.54	3.96	1.95	.75	.97	.84	.39	.35

CAL YR 1981 TOTAL 134296 MEAN 368 MAX 2580 MIN 90 CFSM .96 IN 12.98
WTR YR 1982 TOTAL 135232 MEAN 370 MAX 4120 MIN 98 CFSM .96 IN 13.07

04118000 THORNAPPLE RIVER NEAR CALEDONIA, MI

LOCATION.--Lat 42°48'40", long 85°29'00", in NW¼ sec.22, T.5 N., R.10 W., Kent County, Hydrologic Unit 04050007, on right bank 200 ft (61 m) downstream from LaBarge powerplant, 2.3 mi (3.7 km) northeast of Caledonia, and 3.3 mi (5.3 km) downstream from Coldwater River.

DRAINAGE AREA.--773 mi² (2,002 km²).

PERIOD OF RECORD.--October 1930 to September 1938, October 1951 to March 1982 (discontinued). Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 824: 1931-36. WSP 1307: 1931-37.

GAGE.--Water-stage recorder. Datum of gage is 676.31 ft (206.139 m) Consumers Power Co. datum. Oct. 1, 1930 to Sept. 30, 1938, non-recording gage at same site and at National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Prior to Dec. 1, 1958, large diurnal fluctuation at low and medium flow caused by powerplant above station; occasional fluctuation since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--38 years (water years 1930-38 and 1951-81), 577 ft³/s (16.34 m³/s), 10.14 in/yr (258 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,290 ft³/s (178 m³/s) May 10, 1956, gage height, 10.79 ft (3.289 m); maximum gage height, 10.96 ft (3.341 m) Apr. 22, 1975; minimum discharge, 1.0 ft³/s (0.028 m³/s) May 28, 1968, gage height, 1.40 ft (0.427 m), result of regulation during bridge construction.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 7, 1947, reached a stage of 14.4 ft (4.39 m) from information by powerplant operator.

EXTREMES FOR CURRENT YEAR.--Maximum discharge during period October 1981 to March 1982, 5,810 ft³/s (165 m³/s) Mar. 18, gage height, 10.63 ft (3.240 m); minimum, 12 ft³/s (0.34 m³/s) Dec. 16, 23, gage height, 1.47 ft (0.448 m), result of unusual regulation during channel dredging.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1490	571	813	414	410	515						
2	1750	546	792	405	400	514						
3	1840	521	768	432	400	475						
4	1890	525	736	648	400	450						
5	1840	500	704	798	410	420						
6	1720	496	668	869	410	500						
7	1560	490	639	893	410	536						
8	1360	467	617	814	410	490						
9	1180	455	594	750	410	495						
10	1040	448	567	650	400	462						
11	914	442	527	580	400	527						
12	809	440	511	580	400	891						
13	736	422	504	580	400	2920						
14	683	416	471	580	400	4490						
15	664	416	430	560	400	4760						
16	642	413	420	540	430	5100						
17	623	411	420	540	450	5640						
18	672	410	400	520	450	5650						
19	700	418	400	480	450	5160						
20	784	539	380	450	462	5060						
21	811	628	380	430	492	4530						
22	844	652	380	420	496	4000						
23	846	682	390	420	516	3510						
24	844	666	380	420	547	3120						
25	832	620	350	420	523	2770						
26	811	613	370	420	514	2450						
27	776	811	400	420	524	2160						
28	705	869	410	420	504	1830						
29	663	866	400	420	---	1600						
30	631	840	380	420	---	1420						
31	658	---	390	410	---	1710						
TOTAL	31318	16593	15591	16703	12418	74155	---	---	---	---	---	---
MEAN	1010	553	503	539	444	2392	---	---	---	---	---	---
MAX	1890	869	813	893	547	5650	---	---	---	---	---	---
MIN	623	410	350	405	400	420	---	---	---	---	---	---
CFSM	1.31	.72	.65	.70	.57	3.09	---	---	---	---	---	---
IN.	1.51	.80	.75	.80	.60	3.57	---	---	---	---	---	---

CAL YR 1981 TOTAL 289010 MEAN 792 MAX 4190 MIN 209 CFSM 1.03 IN 13.91

04118500 ROGUE RIVER NEAR ROCKFORD, MI

LOCATION.--Lat 43°05'00", long 85°35'30", in NE¼ sec.15, T.8 N., R.11 W., Kent County, Hydrologic Unit 04050006, on left bank at downstream side of highway bridge, 2.2 mi (3.5 km) upstream from mouth, and 3.0 mi (4.8 km) southwest of Rockford.

DRAINAGE AREA.--234 mi² (606 km²).

PERIOD OF RECORD.--February 1952 to September 1982 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 624.80 ft (190.439 m) National Geodetic Vertical Datum of 1929 (levels by Johnson and Anderson, Inc.). Prior to Aug. 30, 1952, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Some diurnal fluctuation caused by mills above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--30 years, 230 ft³/s (6.514 m³/s), 13.35 in/yr (339 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,540 ft³/s (100 m³/s) Mar. 6, 1976, gage height, 9.29 ft (2.832 m); minimum, 28 ft³/s (0.79 m³/s) Jan. 22, 1967, gage height, 3.41 ft (1.039 m); minimum daily, 49 ft³/s (1.39 m³/s) Aug. 27, 1955.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,080 ft³/s (58.9 m³/s) Oct. 2, gage height, 8.62 ft (2.627 m); minimum, 104 ft³/s (2.95 m³/s) Mar. 3; minimum gage height, 3.85 ft (1.173 m) Mar. 3, Aug. 17, 18.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1290	252	487	175	175	195	418	256	224	140	166	194
2	1370	246	450	171	175	196	419	248	212	132	159	174
3	1810	240	413	177	175	186	478	240	201	135	155	168
4	1240	236	394	240	175	155	475	234	191	135	189	164
5	857	234	399	244	175	172	454	229	177	133	195	155
6	690	234	377	253	170	205	391	228	169	127	192	150
7	554	232	342	255	170	218	403	232	161	125	176	146
8	484	232	319	258	170	228	396	224	158	122	162	144
9	504	228	293	255	170	188	419	215	155	118	151	136
10	494	225	271	234	170	171	410	207	158	120	145	134
11	426	221	244	225	170	190	392	200	156	128	140	132
12	369	215	256	220	170	218	403	195	155	138	133	129
13	332	211	246	210	170	686	482	190	151	136	130	127
14	310	208	235	205	175	862	592	187	147	177	127	127
15	312	206	226	200	175	1410	713	187	168	183	125	133
16	278	205	222	200	180	1460	663	227	191	156	122	140
17	288	205	214	195	185	1200	654	223	204	640	122	144
18	332	204	192	195	190	1030	661	218	230	452	115	183
19	345	206	192	195	195	853	634	212	245	480	125	179
20	387	253	186	190	195	719	609	195	227	440	236	184
21	417	253	200	190	200	665	563	186	216	668	183	171
22	435	255	200	190	207	610	504	191	207	612	164	169
23	393	261	200	190	213	558	448	195	191	412	153	161
24	363	261	200	190	218	532	396	198	175	315	149	154
25	342	252	195	190	210	520	356	205	168	255	183	152
26	330	270	190	190	200	502	330	208	171	215	181	153
27	315	363	190	190	193	459	307	216	169	196	172	154
28	298	430	185	188	197	408	275	233	165	199	151	149
29	282	607	185	188	---	366	270	238	156	199	152	146
30	270	605	180	185	---	358	263	238	148	200	191	141
31	260	---	180	180	---	400	---	220	---	184	195	---
TOTAL	16377	8050	8063	6368	5168	15920	13778	6675	5446	7672	4939	4593
MEAN	528	268	260	205	185	514	459	215	182	247	159	153
MAX	1810	607	487	258	218	1460	713	256	245	668	236	194
MIN	260	204	180	171	170	155	263	186	147	118	115	127
CFSM	2.26	1.15	1.11	.88	.79	2.20	1.96	.92	.78	1.06	.68	.65
IN.	2.60	1.28	1.28	1.01	.82	2.53	2.19	1.06	.87	1.22	.79	.73

CAL YR 1981 TOTAL 95789 MEAN 262 MAX 1810 MIN 89 CFSM 1.12 IN 15.23
WTR YR 1982 TOTAL 103049 MEAN 282 MAX 1810 MIN 115 CFSM 1.21 IN 16.38

04119000 GRAND RIVER AT GRAND RAPIDS, MI

LOCATION.--Lat 42°57'52", long 85°40'35", in NE¼ sec.25, T.7 N., R.12 W., Kent County, Hydrologic Unit 04050006, on right bank 500 ft (152 m) upstream from bridge on Fulton Street, 1.7 mi (2.7 km) upstream from Plaster Creek, and at mile 41 (66 km).

DRAINAGE AREA.--4,900 mi² (12,700 km²), approximately.

PERIOD OF RECORD.--March 1901 to December 1905, January 1906 to August 1918 (gage heights only), October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height records collected in this vicinity since 1907 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 924: 1938(M). WSP 1387: 1901-5, 1940.

GAGE.--Water-stage recorder. Datum of gage is 585.70 ft (178.521 m) National Geodetic Vertical Datum of 1929 (levels by City of Grand Rapids). March 1901 to August 1918, nonrecording gage at Fulton Street Bridge 500 ft (152 m) downstream and Oct. 1, 1930 to Oct. 26, 1953, water-stage recorder at sewage pumping station 1 mi (1.6 km) downstream at datum 2.99 ft (0.911 m) higher.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Dec. 23 to Jan. 27, which are fair. Moderate diurnal fluctuation at low and medium flow caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--56 years, 3,553 ft³/s (100.6 m³/s), 9.85 in/yr (250 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 54,000 ft³/s (1,530 m³/s) Mar. 28, 1904, gage height, 19.5 ft (5.94 m), from graph based on gage readings, site then in use; minimum daily, 381 ft³/s (10.8 m³/s) Aug. 9, 17, 1936.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1901, 54,000 ft³/s (1,530 m³/s) Mar. 28, 1904.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 26,700 ft³/s (756 m³/s) Mar. 19, gage height, 18.83 ft (5.739 m): minimum, 1,230 ft³/s (34.8 m³/s) Sept. 12, gage height, 2.85 ft (0.869 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8350	4370	5520	2400	2100	2720	10200	4370	4140	2940	2420	1810
2	10800	4150	5520	2800	2100	2700	10500	4150	4820	2890	2420	1660
3	14100	4040	5380	3200	2000	3040	11200	3980	5380	2890	2240	1660
4	17600	3960	5240	3100	2000	2820	11600	3160	5530	2690	2580	1570
5	20000	3900	5110	3500	2000	2820	11500	3240	5250	2490	2200	1530
6	20100	3850	4860	4300	2000	2840	11100	3300	4860	2380	2200	1570
7	18200	3670	4740	4500	2000	2910	10500	3050	4440	2280	1960	1540
8	16100	3480	4370	4000	2100	2850	9780	2630	4010	2390	2050	1360
9	14100	3320	3840	3600	2100	2280	9160	2710	3780	2170	1930	1480
10	12400	3260	3720	3200	2100	2570	8690	2960	3440	2140	2040	1470
11	11000	3290	3740	2800	2100	2770	8470	2840	3440	2390	1990	1350
12	9730	3170	3580	2700	2100	3500	8520	2810	3380	2260	1700	1300
13	8460	3060	3420	2500	2200	8030	8980	2790	3010	2230	1600	1370
14	7310	2920	3360	2500	2200	13100	9270	2690	2740	2430	1750	1380
15	7270	2930	3180	2400	2300	15700	9290	2740	2720	1890	1600	1550
16	6390	2790	3370	2400	2400	20000	9260	2850	2660	1850	1510	1590
17	5930	2460	3340	2400	2500	24100	9140	2700	2690	3400	1470	1880
18	5790	2500	2800	2400	2550	25900	8680	2620	2870	4760	1440	2140
19	5570	2570	2280	2400	2690	26500	7990	2680	2940	4420	1390	1930
20	5250	3310	2000	2400	2610	26000	7700	2660	3120	4220	1660	1950
21	5390	3660	1810	2300	2730	24400	7260	2540	3670	3520	1750	2060
22	5540	3960	2470	2300	2720	22000	6860	2750	3470	3480	1850	1760
23	5530	4190	2600	2300	2720	19800	6520	2640	3180	3050	1620	1970
24	5360	4020	2700	2200	2940	17900	6160	2650	3230	2530	1490	2060
25	5180	4090	2900	2200	3050	16200	5890	3050	3130	2320	2040	1890
26	5030	4190	2500	2200	3180	14700	5870	2990	2980	2200	2050	1650
27	4760	4620	2200	2200	3020	13400	5290	2660	2730	2070	2090	1810
28	4740	5070	2300	2100	2900	12400	5150	2840	2600	2400	1970	1680
29	4600	5490	2300	2100	---	11300	5420	3170	2390	2690	1880	2020
30	4560	5570	2300	2100	---	10500	4350	3480	2750	2710	1900	1950
31	4380	---	2300	2100	---	10300	---	3670	---	2540	1990	---
TOTAL	279520	111860	105750	83600	67410	366050	250300	93370	105350	84620	58780	50940
MEAN	9017	3729	3411	2697	2408	11810	8343	3012	3512	2730	1896	1698
MAX	20100	5570	5520	4500	3180	26500	11600	4370	5530	4760	2580	2140
MIN	4380	2460	1810	2100	2000	2280	4350	2540	2390	1850	1390	1300
CFSM	1.84	.76	.70	.55	.49	2.41	1.70	.62	.72	.56	.39	.35
IN.	2.12	.85	.80	.63	.51	2.78	1.90	.71	.80	.64	.45	.39

CAL YR 1981 TOTAL 1618660 MEAN 4435 MAX 20100 MIN 1040 CFSM .91 IN 12.29
WTR YR 1982 TOTAL 1657550 MEAN 4541 MAX 26500 MIN 1300 CFSM .93 IN 12.58

04119300 GRAND RIVER AT EASTMANVILLE, MI

(National stream-quality accounting network station)

LOCATION.--Lat 43°00'53", long 85°57'21", in NE¼ NW¼ sec.10, T.7 N., R.14 W., Ottawa County, Hydrologic Unit 04050006, at bridge on 68th Avenue in Eastmanville, 1.1 mi (1.8 km) downstream from Deer Creek, and at mile 19.3 (31.1 km).

DRAINAGE AREA.--5,230 mi² (13,550 km²), approximately.

PERIOD OF RECORD.--February 1979 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1979 to current year.
WATER TEMPERATURES: February 1979 to current year.

INSTRUMENTATION.--Water-quality monitor since October 1980.

REMARKS.--In addition to water-quality monitor, once-daily samples were collected by a local observer, between 1600 and 1700 hours. Bimonthly samples were collected at bridge.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 1,100 micromhos Mar. 2, 1979; minimum observed, 324 micromhos Mar. 24, 1982.
WATER TEMPERATURES: Maximum daily, 28.0°C July 8, 1981; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum observed, 816 micromhos Feb. 20; minimum observed, 324 micromhos Mar. 24.
WATER TEMPERATURE: Maximum, 27.0°C July 16; minimum observed, 0.0°C Jan. 25.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV												
10...	1230	--	663	7.7	7.0	11.0	92	K18	57	290	41	80
JAN												
25...	1500	--	760	--	.0	12.3	85	K19	K31	310	61	80
MAR												
25...	1100	20400	380	7.5	4.5	11.1	88	77	78	180	60	49
APR												
21...	1030	9260	541	8.0	10.5	10.9	98	490	280	250	62	68
JUL												
14...	1320	3210	619	8.1	25.0	11.3	138	570	610	260	62	67
AUG												
25...	1300	2700	631	8.1	22.0	10.5	122	2700	K250	240	71	61

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
NOV												
10...	21	18	12	2.4	239	62	38	.2	7.0	424	383	--
JAN												
25...	27	30	17	2.5	250	68	47	.2	9.4	457	415	--
MAR												
25...	14	8.2	9	3.4	130	40	19	.1	6.0	252	224	.34
APR												
21...	20	15	11	2.5	190	46	29	.2	3.0	327	307	.44
JUL												
14...	23	30	20	2.1	200	51	46	.2	3.7	421	354	.57
AUG												
25...	22	31	22	2.5	172	61	58	.2	2.4	386	342	.52

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV												
10...	--	1.3	.290	.37	.86	.090	.28	.040	.030	8	--	100
JAN												
25...	--	1.9	.600	.77	1.30	.140	.43	.070	.040	--	--	--
MAR												
25...	13900	2.0	.250	.32	1.20	.110	.34	.070	.050	20	1100	100
APR												
21...	8180	1.2	.130	.17	.97	.050	.15	.020	<.010	41	1030	100
JUL												
14...	3650	.52	.030	.04	1.10	.120	.37	.010	<.010	38	329	100
AUG												
25...	2810	.66	<.010	.01	.20	<.010	--	<.010	<.010	49	357	100

STREAMS TRIBUTARY TO LAKE MICHIGAN

04119380 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
JAN										
25...	1500	1	1	100	53	<1	<1	20	10	<1
MAR										
25...	1100	1	1	100	37	1	<1	10	<10	1
JUL										
14...	1320	2	1	<100	57	<1	1	10	<10	2
AUG										
25...	1300	--	2	--	51	--	<1	--	20	--

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
JAN										
25...	<1	7	3	230	25	9	1	30	27	<.1
MAR										
25...	<1	9	2	510	110	12	1	30	9	.1
JUL										
14...	1	19	7	750	9	6	2	100	2	.2
AUG										
25...	3	--	10	--	39	--	4	--	4	--

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
JAN									
25...	<.1	6	6	<1	<1	<1	<1	10	--
MAR									
25...	.1	12	4	<1	<1	<1	<1	40	13
JUL									
14...	<.1	12	5	<1	<1	<1	<1	30	4
AUG									
25...	<.1	--	14	--	<1	--	<1	--	5

04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	455	665										
2	458	679										
3	335	672										
4	338	672										
5	338	689										
6	338	691										
7	340	689										
8	422	689										
9	422	---										
10	421	---										
11	437	---										
12	467	---										
13	472	---										
14	537	---										
15	535	---										
16	539	---										
17	536	---										
18	567	---										
19	580	---										
20	574	---										
21	585	---										
22	585	---										
23	584	---										
24	586	---										
25	616	---										
26	619	---										
27	635	---										
28	637	---										
29	665	---										
30	664	---										
31	665	---										
MEAN	515											

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1				---	---	---	468	462	465	607	582	596
2				---	---	---	469	464	467	618	592	607
3				---	---	---	466	461	463	622	610	617
4				---	---	---	468	462	466	631	613	624
5				---	---	---	474	468	472	645	622	637
6				---	---	---	479	476	477	647	639	642
7				---	---	---	489	481	485	645	630	638
8				---	---	---	494	489	492	648	628	640
9				---	---	---	495	493	494	657	640	649
10				---	---	---	503	495	500	655	640	650
11				---	---	---	513	503	508	647	639	643
12				---	---	---	520	513	516	651	636	644
13				---	---	---	518	510	515	652	642	647
14				---	---	---	517	512	514	650	642	646
15				---	---	---	520	513	518	660	649	656
16				---	---	---	520	515	518	656	630	648
17				---	---	---	525	516	520	644	629	636
18				---	---	---	532	518	526	666	641	656
19				---	---	---	535	528	531	677	623	664
20				---	---	---	547	535	542	623	613	618
21				---	---	---	550	542	547	612	598	603
22				---	---	---	555	549	552	603	588	600
23				---	---	---	565	555	560	604	594	599
24				---	---	---	573	562	568	597	592	594
25				---	---	---	577	574	576	597	592	594
26				408	393	400	582	578	580	592	582	587
27				421	410	415	590	582	586	---	---	---
28				435	422	428	603	582	593	596	579	588
29				449	435	441	605	597	601	599	578	587
30				459	449	455	596	587	590	589	578	583
31				465	457	461	---	---	---	581	565	572
MONTH							605	461	525			

STREAMS TRIBUTARY TO LAKE MICHIGAN

04119300 GRAND RIVER AT EASTMANVILLE, MI

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	570	564	568	621	599	611						
2	567	558	563	607	594	602						
3	563	548	556	617	602	608						
4	549	542	545	611	582	595						
5	548	542	544	603	591	598						
6	545	542	543	618	579	597						
7	549	541	544	639	596	621						
8	565	542	555	620	608	615						
9	---	---	---	623	610	616						
10	585	569	575	641	596	611						
11	578	562	574	615	610	612						
12	577	571	575	609	574	585						
13	584	572	578	624	581	597						
14	596	582	588	625	582	613						
15	598	589	593	---	---	---						
16	594	589	591	---	---	---						
17	610	589	598	---	---	---						
18	611	607	610	---	---	---						
19	610	601	606	---	---	---						
20	609	578	592	---	---	---						
21	590	569	579	---	---	---						
22	577	568	574	---	---	---						
23	580	569	576	---	---	---						
24	584	569	575	---	---	---						
25	590	576	584	---	---	---						
26	602	584	594	---	---	---						
27	618	589	601	---	---	---						
28	620	580	602	---	---	---						
29	622	602	611	---	---	---						
30	631	602	619	---	---	---						
31	---	---	---	---	---	---						

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13.0	10.0										
2	13.0	10.0										
3	12.0	11.0										
4	12.0	11.0										
5	12.0	11.0										
6	11.0	11.0										
7	11.0	10.0										
8	11.0	10.0										
9	11.0	---										
10	11.0	---										
11	11.0	---										
12	11.0	---										
13	11.0	---										
14	11.0	---										
15	11.0	---										
16	11.0	---										
17	11.0	---										
18	11.0	---										
19	11.0	---										
20	11.0	---										
21	11.0	---										
22	10.0	---										
23	10.0	---										
24	10.0	---										
25	10.0	---										
26	9.0	---										
27	8.0	---										
28	8.0	---										
29	9.0	---										
30	9.0	---										
31	9.0	---										
MEAN	10.5											

04119380 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1				---	---	---	---	---	---	15.0	13.0	14.0
2				---	---	---	---	---	---	16.0	13.5	15.0
3				---	---	---	6.5	4.5	6.0	16.5	14.5	15.5
4				---	---	---	4.5	4.0	4.0	18.0	15.5	16.5
5				---	---	---	3.5	2.5	3.0	18.0	16.5	17.5
6				---	---	---	2.5	2.0	2.0	19.0	17.0	18.0
7				---	---	---	2.5	1.5	2.0	18.0	17.0	17.5
8				---	---	---	3.0	2.0	2.5	18.0	16.0	17.0
9				---	---	---	4.0	2.5	3.5	18.5	16.0	17.5
10				---	---	---	4.5	4.0	4.0	18.5	16.5	18.0
11				---	---	---	5.0	4.0	4.5	20.0	17.5	19.0
12				---	---	---	5.0	4.5	4.5	21.5	19.0	20.5
13				---	---	---	5.5	5.0	5.0	22.5	20.0	21.5
14				---	---	---	6.0	5.0	5.5	23.0	21.0	22.0
15				---	---	---	8.0	6.0	7.0	23.0	21.5	22.0
16				---	---	---	9.5	8.0	9.0	23.0	21.5	22.0
17				---	---	---	10.0	9.5	10.0	23.5	21.5	22.5
18				---	---	---	11.0	10.0	10.5	24.0	22.0	23.0
19				---	---	---	11.5	10.5	11.0	23.5	22.0	23.0
20				---	---	---	---	---	---	23.0	21.5	22.5
21				---	---	---	11.0	10.5	10.5	21.0	19.0	20.5
22				---	---	---	11.5	10.0	10.5	19.0	18.0	18.5
23				---	---	---	12.0	10.5	11.5	18.0	16.5	17.0
24				---	---	---	13.0	11.5	12.0	16.5	16.0	16.5
25				---	---	---	13.5	12.5	13.0	17.5	16.0	17.0
26				4.0	3.5	4.0	14.0	13.0	13.5	18.0	16.5	17.5
27				3.5	2.5	3.0	14.0	12.5	13.0	18.5	17.5	18.0
28				3.5	2.5	3.0	14.5	12.5	13.5	18.5	17.5	18.0
29				4.0	3.0	3.5	14.0	13.5	14.0	20.0	18.0	19.0
30				5.0	4.0	4.5	14.0	13.5	13.5	21.5	19.0	20.5
31				5.5	5.0	5.0	---	---	---	22.0	20.0	21.0
MONTH										24.0	13.0	19.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	21.5	20.0	21.0	22.0	19.5	21.0	24.5	23.0	24.0	20.0	19.0	19.5
2	21.5	20.0	20.5	22.0	20.0	21.5	24.5	23.5	24.0	20.5	19.5	19.5
3	20.0	19.0	20.0	22.5	21.0	22.0	25.5	23.5	24.5	19.5	18.5	19.0
4	19.5	18.5	19.0	24.0	21.5	22.5	25.0	24.0	24.5	20.0	17.5	19.0
5	19.5	18.5	19.0	25.0	22.5	24.0	24.5	23.5	24.0	20.0	18.0	19.0
6	20.0	18.5	19.0	26.0	24.0	25.0	25.0	23.5	24.5	20.0	18.5	19.5
7	20.0	19.0	19.5	26.0	24.0	25.0	26.5	24.0	25.5	19.0	17.5	18.5
8	21.0	19.0	20.0	25.5	24.0	25.0	26.5	25.5	25.5	19.0	17.0	18.0
9	21.5	20.0	21.0	26.5	23.5	25.0	25.5	23.5	24.5	20.0	17.5	18.5
10	21.0	20.0	20.5	26.0	24.5	25.0	23.5	22.5	23.0	21.0	18.5	20.0
11	21.5	19.5	20.5	24.5	22.0	24.0	22.5	21.0	22.0	22.0	20.0	21.0
12	21.0	19.5	20.5	24.5	22.0	23.5	22.5	20.5	21.5	23.0	20.5	21.5
13	21.0	19.5	20.5	25.0	22.5	24.0	22.5	20.5	21.5	23.5	21.5	22.5
14	22.0	19.5	21.0	25.5	24.0	24.5	23.0	21.0	22.0	23.5	22.0	22.5
15	21.0	20.0	20.5	26.0	23.0	24.5	24.0	21.5	22.5	22.0	20.5	21.0
16	20.0	19.0	19.5	27.0	24.5	25.5	24.5	22.0	23.0	20.5	18.5	19.5
17	20.0	17.5	19.0	26.5	25.0	26.0	24.5	22.5	23.5	18.5	18.0	18.0
18	19.5	19.0	19.0	25.5	25.0	25.0	24.5	22.0	23.5	17.5	16.5	17.0
19	19.5	18.5	19.0	25.5	24.5	25.0	24.5	23.0	23.5	17.0	15.5	16.0
20	20.0	18.5	19.5	26.0	24.0	25.0	24.5	23.0	24.0	16.5	15.0	16.0
21	20.0	18.5	19.0	26.0	24.0	25.0	24.0	22.0	23.0	15.0	14.5	15.0
22	20.0	18.5	19.5	25.5	24.5	25.0	22.5	21.0	21.5	15.0	14.0	14.5
23	20.5	18.5	19.5	25.5	24.0	25.0	22.5	20.5	21.5	15.5	13.5	14.5
24	20.5	19.0	20.0	26.0	24.0	25.0	22.5	21.0	21.5	15.5	15.0	15.0
25	20.5	19.5	20.0	26.5	24.5	25.5	22.0	20.5	21.0	15.5	15.0	15.0
26	20.5	19.0	20.0	26.5	25.0	26.0	22.0	18.0	19.0	16.0	15.0	15.5
27	21.5	19.0	20.5	26.0	25.0	25.5	21.0	18.0	20.0	16.0	15.5	16.0
28	22.5	20.5	21.5	25.5	24.0	25.0	---	---	---	16.5	15.0	16.0
29	22.0	21.0	21.5	25.0	23.0	24.0	---	---	---	17.0	15.5	16.5
30	21.5	20.0	21.0	24.5	23.5	24.0	---	---	---	18.0	16.0	17.0
31	---	---	---	24.5	23.0	24.0	19.5	17.5	18.5	---	---	---
MONTH	22.5	17.5	20.0	27.0	19.5	24.5				23.5	13.5	18.0

04121300 CLAM RIVER AT VOGEL CENTER, MI

LOCATION.--Lat 44°12'02", long 85°03'10", in SW¼ NW¼ sec.21, T.21 N., R.6 W., Missaukee County, Hydrologic Unit 04060102, on left bank 10 ft (3 m) downstream from bridge on county road, 0.5 mi (0.8 km) north of Vogel Center, and 3.5 mi (5.6 km) southeast of Falmouth.

DRAINAGE AREA.--243 mi² (629 km²).

PERIOD OF RECORD.--June 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,130 ft (344 m), from topographic map.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation at low flow by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--16 years, 123 ft³/s (3.483 m³/s), 6.87 in/yr (174 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,150 ft³/s (32.6 m³/s) Apr. 13, 1971, gage height, 6.33 ft (1.929 m); minimum, 29 ft³/s (0.82 m³/s) Nov. 3, 1969, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 350 ft³/s (9.91 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Apr. 3	1100	424	12.0	4.62	1.408	Apr. 18	0900	*542	15.3	*5.13	1.564

Minimum discharge, 50 ft³/s (1.42 m³/s) Sept. 13, gage height, 2.42 ft (0.738 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	78	84	117	65	84	81	358	170	104	70	61	78
2	83	83	121	67	84	76	405	167	104	68	61	107
3	74	82	131	70	84	73	413	163	92	67	61	92
4	68	82	129	72	84	74	348	160	86	68	61	78
5	65	73	120	74	84	75	351	158	82	67	61	73
6	70	71	112	76	84	76	276	158	79	66	61	68
7	76	72	109	77	84	78	252	155	76	64	66	64
8	71	76	111	79	84	79	206	151	73	63	69	61
9	65	77	105	80	84	80	196	148	73	61	68	60
10	68	78	101	81	85	82	204	145	74	62	69	60
11	68	84	100	82	85	84	198	143	73	72	68	59
12	70	87	100	83	85	90	184	144	73	75	69	59
13	67	88	100	83	86	110	198	144	79	68	63	58
14	68	88	100	84	87	121	230	142	72	75	59	60
15	76	98	99	84	87	115	255	130	73	94	61	65
16	80	91	94	84	87	109	300	114	81	81	59	68
17	77	88	83	83	87	106	426	102	80	75	57	67
18	96	88	82	83	87	106	530	95	79	111	56	68
19	118	89	84	83	86	105	438	102	86	150	56	67
20	111	83	88	83	87	106	361	96	85	113	60	68
21	98	108	94	83	88	107	326	87	89	85	62	70
22	88	106	91	83	92	107	288	86	87	75	61	69
23	85	100	93	84	95	112	251	94	80	70	61	66
24	87	96	93	84	89	131	226	112	76	67	60	67
25	88	92	90	84	77	157	209	105	77	65	71	76
26	87	104	86	84	78	173	199	96	86	64	75	77
27	88	132	87	84	80	166	189	96	84	66	66	73
28	85	155	88	84	82	162	183	139	77	67	61	69
29	84	143	88	84	---	161	177	150	75	65	60	67
30	84	126	86	84	---	181	173	120	72	64	64	65
31	83	---	82	84	---	275	---	102	---	61	64	---
TOTAL	2506	2824	3064	2495	2386	3558	8350	3974	2427	2319	1951	2079
MEAN	80.8	94.1	98.8	80.5	85.2	115	278	128	80.9	74.8	62.9	69.3
MAX	118	155	131	84	95	275	530	170	104	150	75	107
MIN	65	71	82	65	77	73	173	86	72	61	56	58
CFSM	.33	.39	.41	.33	.35	.47	1.14	.53	.33	.31	.26	.29
IN.	.38	.43	.47	.38	.37	.54	1.28	.61	.37	.36	.30	.32

CAL YR 1981 TOTAL 35413 MEAN 97.0 MAX 348 MIN 49 CFSM .40 IN 5.42
WTR YR 1982 TOTAL 37933 MEAN 104 MAX 530 MIN 56 CFSM .43 IN 5.81

04121500 MUSKEGON RIVER AT EVART, MI

LOCATION.--Lat 43°53'57", long 85°15'19", in NW¼ NE¼ sec.3, T.17 N., R.8 W., Osceola County, Hydrologic Unit 04060102, on right bank 500 ft (152 m) downstream from bridge on U.S. Highway 10 in Evart, 0.4 mi (0.6 km) upstream from Twin Creek, and at mile 123.9 (199.4 km).

DRAINAGE AREA.--1,450 mi² (3,760 km²) approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1930 to September 1931, October 1933 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1437: 1934, 1947(M).

GAGE.--Water-stage recorder. Datum of gage is 977.72 ft (298.009 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 7, 1956, nonrecording gages at sites 400 ft (122 m) and 500 ft (152 m) upstream at present datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Some regulation during low flow from dams above station.

AVERAGE DISCHARGE.--50 years, 992 ft³/s (28.09 m³/s), 9.29 in/yr (236 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,790 ft³/s (221 m³/s) Mar. 29, 1976; maximum gage height, 14.42 ft (4.395 m) Apr. 9, 1959; minimum discharge observed, 164 ft³/s (4.64 m³/s) Dec. 20, 1947, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,310 ft³/s (122 m³/s) Apr. 3, gage height, 10.77 ft (3.283 m); maximum gage height, 10.81 ft (3.295 m) Apr. 21; minimum discharge, 405 ft³/s (11.5 m³/s) Aug. 20, gage height, 6.72 ft (2.048 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	687	738	1200	740	670	660	3610	1890	1350	766	547	469
2	697	727	1260	880	670	660	3910	1780	1370	723	525	567
3	666	713	1330	860	670	670	4150	1660	1300	692	517	647
4	641	701	1330	840	670	640	4200	1550	1190	663	514	652
5	622	695	1280	810	670	584	4080	1460	1100	643	517	604
6	674	696	1210	780	670	597	4020	1390	1030	630	511	574
7	712	683	1160	760	670	600	3730	1340	965	621	516	551
8	705	681	1140	740	680	620	3490	1280	909	600	497	530
9	693	672	1090	720	690	630	3230	1210	865	578	487	508
10	683	665	980	710	690	638	3010	1170	853	562	484	493
11	675	655	879	700	690	637	2780	1120	815	568	471	477
12	655	654	860	690	690	695	2570	1100	784	596	466	466
13	646	644	860	670	690	787	2480	1090	756	602	465	457
14	639	640	870	660	700	987	2420	1060	739	597	454	460
15	695	635	880	660	700	978	2370	1030	770	694	441	456
16	700	643	830	660	700	1110	2460	1010	823	792	436	460
17	702	642	730	670	700	1210	3010	1030	813	708	429	471
18	915	640	640	670	700	1300	3090	1050	843	856	416	498
19	971	645	598	670	710	1410	3350	1010	1020	951	410	494
20	972	680	609	670	710	1520	3760	995	1010	960	408	497
21	929	673	653	670	710	1610	3900	985	1070	865	417	498
22	889	721	735	670	713	1650	3810	966	1110	777	417	496
23	879	758	794	680	700	1710	3640	1060	1030	721	430	500
24	864	755	770	680	700	2060	3370	1190	962	630	437	498
25	845	708	760	670	700	2460	3060	1190	934	634	536	508
26	825	782	750	670	684	2570	2800	1130	991	617	532	542
27	803	1180	720	670	670	2450	2570	1080	960	608	498	563
28	780	1310	680	660	660	2260	2350	1310	916	619	466	579
29	760	1270	680	660	---	2170	2180	1450	865	595	446	579
30	746	1240	680	660	---	2460	2020	1430	817	586	457	570
31	746	---	690	660	---	3190	---	1330	---	566	461	---
TOTAL	23416	22846	27648	21910	19277	41383	95420	38346	28960	21070	14608	15664
MEAN	755	762	892	707	688	1335	3181	1237	965	680	471	522
MAX	972	1310	1330	880	713	3190	4200	1890	1370	960	547	652
MIN	622	635	598	660	660	584	2020	966	739	562	408	456
CFSM	.52	.53	.62	.49	.47	.92	2.19	.85	.67	.47	.33	.36
IN.	.60	.59	.71	.56	.49	1.06	2.45	.98	.74	.54	.37	.40

CAL YR 1981 TOTAL 347816 MEAN 953 MAX 3070 MIN 415 CFSM .66 IN 8.92
WTR YR 1982 TOTAL 370548 MEAN 1015 MAX 4200 MIN 408 CFSM .70 IN 9.51

04121500 MUSKEGON RIVER AT EVART, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: November 1956 to current year.

INSTRUMENTATION.--Temperature recorder since November 1956.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 28.0°C July 1, 1963, July 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 24.5°C July 17, 18; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	9.0	8.0	8.5	7.0	1.0	1.0	.0	.0	.0	.0	.0	.0
2	8.0	7.0	8.5	7.0	1.0	1.0	.0	.0	.0	.0	.0	.0
3	8.0	6.0	8.0	6.5	1.0	1.0	.0	.0	.0	.0	.0	.0
4	8.0	6.5	6.5	6.0	1.5	1.0	.0	.0	.0	.0	.0	.0
5	9.0	6.5	7.0	6.5	1.5	1.0	.0	.0	.0	.0	.0	.0
6	9.0	8.5	7.0	6.0	1.0	.5	.0	.0	.0	.0	.0	.0
7	8.5	8.0	6.0	5.0	.5	.5	.0	.0	.0	.0	.0	.0
8	8.5	6.5	5.5	5.0	.5	.5	.0	.0	.0	.0	.0	.0
9	8.0	6.5	5.0	4.0	.5	.5	.0	.0	.0	.0	.0	.0
10	8.0	7.0	4.0	3.5	.5	.0	.0	.0	.0	.0	.0	.0
11	8.5	6.5	4.0	3.5	.0	.0	.0	.0	.0	.0	.0	.0
12	8.5	7.0	3.5	3.0	.0	.0	.0	.0	.0	.0	.0	.0
13	8.5	6.5	3.5	3.0	.0	.0	.0	.0	.0	.0	.0	.0
14	8.5	8.0	3.5	3.0	.0	.0	.0	.0	.0	.0	.0	.0
15	8.0	8.0	3.5	3.0	.0	.0	.0	.0	.0	.0	.0	.0
16	8.0	6.5	3.5	3.0	.0	.0	.0	.0	.0	.0	.0	.0
17	8.0	6.5	3.5	3.0	.0	.0	.0	.0	.0	.0	.0	.0
18	7.0	7.0	3.5	3.0	.0	.0	.5	.0	.0	.0	.0	.0
19	7.0	6.5	3.5	3.5	.0	.0	.5	.5	.0	.0	.0	.0
20	6.5	5.5	3.5	.5	.0	.0	.5	.0	.0	.0	.0	.0
21	6.5	6.0	.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
22	6.0	5.5	1.0	.5	.0	.0	.0	.0	.0	.0	.0	.0
23	5.5	5.0	1.5	1.0	.0	.0	.0	.0	.0	.0	2.0	.0
24	5.0	4.5	1.5	1.0	.0	.0	.0	.0	.0	.0	3.0	2.0
25	4.5	4.0	1.0	1.0	.0	.0	.0	.0	.5	.0	3.0	1.5
26	5.0	4.0	1.0	1.0	.0	.0	.0	.0	.5	.0	1.5	1.0
27	6.5	5.0	1.0	1.0	.0	.0	.0	.0	.5	.0	1.5	1.0
28	6.5	6.0	1.0	1.0	.0	.0	.0	.0	.0	.0	1.5	1.0
29	6.5	5.5	1.0	1.0	.0	.0	.0	.0	---	---	2.0	1.5
30	6.5	5.5	1.0	1.0	.0	.0	.0	.0	---	---	2.0	2.0
31	7.0	6.0	---	---	.0	.0	.0	.0	---	---	3.0	2.0
MONTH	9.0	4.0	8.5	.5	1.5	.0	.5	.0	.5	.0	3.0	.0

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	APRIL MAX	APRIL MIN	MAY MAX	MAY MIN	JUNE MAX	JUNE MIN	JULY MAX	JULY MIN	AUGUST MAX	AUGUST MIN	SEPTEMBER MAX	SEPTEMBER MIN
1	2.0	1.5	14.0	12.0	20.5	19.0	20.0	16.5	22.0	20.0	16.0	15.0
2	2.0	2.0	14.5	13.0	19.5	18.0	20.5	17.0	22.0	20.5	16.5	15.0
3	2.0	2.0	15.0	13.5	18.5	16.5	21.0	19.0	22.0	20.0	16.0	14.5
4	2.0	1.0	15.5	14.5	18.0	15.5	21.0	19.5	21.5	20.5	16.5	13.5
5	1.0	1.0	15.5	15.0	18.0	15.5	22.0	18.5	21.5	20.0	16.0	13.0
6	1.0	1.0	17.0	15.0	18.5	15.5	23.5	20.5	23.0	19.5	16.0	15.0
7	1.5	1.0	17.0	15.5	18.5	17.0	23.5	21.0	24.0	20.0	16.0	13.5
8	1.5	1.0	15.5	14.5	20.5	17.0	24.0	21.0	23.5	21.5	16.0	13.0
9	3.0	1.5	16.0	14.5	20.5	19.0	23.5	20.0	23.0	20.0	17.0	13.5
10	3.0	3.0	17.0	15.0	19.5	18.5	23.5	20.5	20.0	17.0	18.0	14.5
11	3.0	2.0	18.5	16.0	20.0	16.5	23.0	19.5	19.5	15.5	19.0	16.0
12	3.0	2.0	19.5	18.0	19.5	18.0	21.5	18.0	19.0	15.0	20.0	17.0
13	4.0	3.0	20.0	18.5	20.0	18.0	22.0	19.0	20.0	16.0	21.0	18.5
14	5.0	4.0	20.5	19.0	20.5	18.0	22.0	20.0	19.5	17.0	20.5	18.5
15	6.5	5.0	20.5	19.5	20.0	17.0	23.5	20.5	20.5	17.0	18.5	15.5
16	7.0	6.5	20.0	18.5	18.0	16.5	24.0	21.5	22.0	18.5	15.5	13.5
17	7.0	7.0	20.0	18.5	16.5	15.0	24.5	23.0	22.0	19.5	13.5	12.0
18	8.0	7.0	20.5	18.5	16.0	14.5	24.5	22.0	21.5	18.5	14.0	11.5
19	8.5	8.0	20.5	19.5	16.5	14.0	24.0	21.5	21.5	19.0	13.0	10.5
20	8.5	8.0	20.0	19.0	16.5	15.5	24.0	22.0	22.0	19.5	13.0	11.5
21	7.0	6.5	19.5	17.0	16.5	15.5	24.0	21.5	21.0	18.5	11.5	11.0
22	7.0	6.5	18.5	15.5	17.0	15.0	24.0	22.0	20.0	18.0	12.0	10.5
23	9.0	7.0	15.5	14.0	17.0	15.5	24.0	21.5	19.5	16.0	13.5	10.5
24	10.5	9.0	14.5	13.5	17.0	15.5	24.0	21.0	19.0	16.5	13.5	12.0
25	12.0	10.5	16.0	13.5	17.0	16.0	24.0	21.5	19.0	16.0	13.0	12.0
26	13.0	12.0	16.0	15.5	18.0	15.0	24.0	23.0	19.5	16.5	14.0	13.0
27	12.0	11.0	16.0	15.5	18.0	16.0	23.5	20.5	19.0	18.0	14.0	13.0
28	12.0	11.0	17.0	16.0	20.0	16.0	22.0	19.5	18.0	15.0	14.0	13.0
29	13.0	11.0	19.0	17.0	20.0	18.0	22.0	19.5	16.5	13.5	15.5	13.0
30	13.0	11.5	20.0	18.5	19.5	16.0	22.0	20.0	15.5	13.0	16.5	14.0
31	---	---	20.5	19.5	---	---	23.0	20.0	16.0	13.5	---	---
MONTH	13.0	1.0	20.5	12.0	20.5	14.0	24.5	16.5	24.0	13.0	21.0	10.5

04121900 LITTLE MUSKEGON RIVER NEAR MORLEY, MI

LOCATION.--Lat 43°30'09", long 85°20'33", in SW¼ SW¼ sec.24, T.13 N., R.9 W., Mecosta County, Hydrologic Unit 04060102, on right bank at upstream side of highway bridge on 130th Avenue, 0.5 mi (0.8 km) downstream from Rustford Dam, and 5.2 mi (8.4 km) east of Morley.

DRAINAGE AREA.--138 mi² (357 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 920 ft (280 m), from topographic map.

REMARKS.--Water-discharge records good except those for the winter period and those for the period of no gage-height record, Aug. 8 to Sept. 7, which are poor. Some regulation by dams above station.

AVERAGE DISCHARGE.--16 years, 124 ft³/s (3.512 m³/s), 12.20 in/yr (310 mm/yr).

EXTREMES FOR PERIOD OF RECORD.-- Maximum discharge, 1,390 ft³/s (39.4 m³/s) July 18, 1982, gage height, 6.98 ft (2.128 m); minimum, 22 ft³/s (0.62 m³/s) July 21, 1979, gage height, 1.53 ft (0.466 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 400 ft³/s (11.3 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	1700	413	11.7	3.74	1.140	July 18	2230	*1390	39.4	*6.98	2.128
June 15	2200	424	12.0	3.52	1.073						

Minimum discharge, 58 ft³/s (1.64 m³/s) May 3, gage height, 1.76 ft (0.536 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	314	113	170	86	63	63	322	113	183	97	133	150
2	325	111	206	88	63	63	294	92	142	89	130	138
3	288	108	211	91	64	63	308	86	114	86	120	120
4	222	107	191	92	64	63	297	91	102	84	122	105
5	174	106	168	94	64	63	274	89	92	82	115	100
6	210	109	151	95	64	63	238	92	87	79	108	94
7	215	111	143	96	64	64	204	93	83	78	101	87
8	184	107	141	96	64	65	195	94	81	75	92	81
9	152	102	131	96	64	67	201	96	97	72	87	78
10	136	98	122	96	64	73	207	95	134	70	82	76
11	125	96	115	96	64	83	196	94	105	73	81	75
12	119	95	110	96	64	94	196	93	94	74	78	74
13	113	92	109	90	64	224	250	92	93	70	77	73
14	112	91	109	86	64	296	245	92	86	67	76	93
15	161	91	105	80	64	309	221	94	281	67	75	148
16	149	91	105	78	64	321	243	100	339	64	74	116
17	134	92	101	75	64	339	354	95	274	64	74	102
18	218	92	105	74	64	350	327	87	237	822	74	129
19	220	93	105	73	64	320	271	87	251	1120	75	113
20	192	108	100	70	65	291	257	84	237	837	75	117
21	160	120	96	70	65	270	236	81	229	525	76	108
22	158	121	91	68	64	266	205	87	186	294	74	102
23	147	117	90	68	64	291	180	105	160	202	76	98
24	135	113	90	68	64	338	164	115	135	168	75	107
25	145	108	89	66	64	372	155	104	141	149	82	103
26	143	115	88	65	64	332	150	94	155	242	78	101
27	135	290	90	65	64	262	149	99	150	232	74	99
28	128	275	90	64	64	218	141	144	140	194	74	95
29	124	253	89	64	---	207	135	152	120	190	96	92
30	118	197	87	64	---	231	129	156	105	164	130	89
31	115	---	87	64	---	317	---	166	---	144	160	---
TOTAL	5271	3724	3685	2474	1792	6378	6744	3162	4633	6574	2844	3063
MEAN	170	124	119	79.8	64.0	206	225	102	154	212	91.7	102
MAX	325	290	211	96	65	372	354	166	339	1120	160	150
MIN	112	91	87	64	63	63	129	81	81	64	74	73
CFSM	1.23	.90	.86	.58	.46	1.49	1.63	.74	1.12	1.54	.66	.74
IN.	1.42	1.00	.99	.67	.48	1.72	1.82	.85	1.25	1.77	.77	.83

CAL YR 1981 TOTAL 39968 MEAN 110 MAX 326 MIN 39 CFSM .80 IN 10.77
WTR YR 1982 TOTAL 50344 MEAN 138 MAX 1120 MIN 63 CFSM 1.00 IN 13.57

04121900 LITTLE MUSKEGON RIVER NEAR MORLEY, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: November 1966 to current year.

INSTRUMENTATION.--Temperature recorder since November 1966.

REMARKS.--Temperature recorder clock stopped Jan. 2-11 (temperature 0.0°C), Jan. 15 to Mar. 7 (range in temperature 0.0 to 4.5°C), Mar. 10 to Apr. 11 (range in temperature 0.5 to 6.5°C), Aug. 22 to Sept. 6 (range in temperature 12.0 to 19.5°C). No record Sept. 27-30.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 28.0°C Aug. 23, 1968, June 28, 1971; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 25.0°C July 17; minimum 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	11.5	10.5	12.0	10.5	3.5	2.5	.0	.0			---	---
2	10.5	9.5	11.5	9.5	3.5	3.5	---	---			---	---
3	9.5	8.0	10.0	8.0	3.5	3.0	---	---			---	---
4	10.0	9.0	10.0	8.0	4.0	3.5	---	---			---	---
5	12.0	10.0	10.5	10.0	4.0	3.5	---	---			---	---
6	12.0	11.5	10.5	8.0	3.5	2.5	---	---			---	---
7	11.5	10.5	8.0	5.5	4.0	3.0	---	---			---	---
8	10.5	9.0	7.5	5.5	4.0	3.0	---	---			.5	.0
9	10.5	9.0	7.5	5.5	3.0	2.0	---	---			3.5	1.0
10	11.0	10.0	5.5	4.0	2.0	1.0	---	---			---	---
11	11.0	9.5	5.5	4.0	1.5	.5	---	---			---	---
12	11.5	9.5	5.5	4.0	2.0	1.5	.0	.0			---	---
13	12.0	9.5	5.5	4.0	2.5	2.0	.0	.0			---	---
14	11.5	10.5	5.5	4.0	3.0	2.5	.0	.0			---	---
15	11.5	11.0	5.5	4.0	2.5	1.5	---	---			---	---
16	11.0	9.0	6.0	4.0	2.0	1.5	---	---			---	---
17	10.5	8.5	6.0	5.5	1.5	1.0	---	---			---	---
18	10.5	10.0	6.5	6.0	1.0	.5	---	---			---	---
19	10.0	8.5	6.5	6.0	.5	.5	---	---			---	---
20	9.5	7.5	6.0	2.5	.5	.5	---	---			---	---
21	9.5	8.5	3.5	3.0	.5	.5	---	---			---	---
22	8.5	7.5	4.0	3.5	2.0	.5	---	---			---	---
23	8.0	6.5	4.0	3.0	2.5	1.5	---	---			---	---
24	6.5	5.0	3.5	2.0	1.5	1.0	---	---			---	---
25	7.0	6.0	2.5	1.5	1.5	1.0	---	---			---	---
26	8.5	6.5	3.5	2.5	2.0	1.0	---	---			---	---
27	9.5	8.5	3.5	2.5	2.5	2.0	---	---			---	---
28	9.5	8.0	2.5	2.5	2.5	2.0	---	---			---	---
29	9.0	8.0	2.5	2.5	2.0	2.0	---	---			---	---
30	9.5	8.0	2.5	2.0	2.0	1.0	---	---			---	---
31	10.5	9.0	---	---	1.0	.5	---	---			---	---
MONTH	12.0	5.0	12.0	1.5	4.0	.5						

04121900 LITTLE MUSKEGON RIVER NEAR MORLEY, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	---	---	15.5	11.0	20.5	17.5	19.5	15.0	21.0	19.0	---	---
2	---	---	16.0	10.5	19.0	15.5	20.0	15.5	21.0	19.0	---	---
3	---	---	16.5	11.5	17.0	14.5	20.5	17.5	22.5	19.0	---	---
4	---	---	17.5	12.5	17.0	12.5	21.0	17.5	22.5	20.5	---	---
5	---	---	16.0	14.0	18.5	13.5	23.0	17.5	22.5	20.0	---	---
6	---	---	18.0	14.5	19.5	14.5	23.0	20.0	23.5	20.0	---	---
7	---	---	17.0	14.0	19.0	16.5	24.0	20.0	23.0	20.0	16.5	13.0
8	---	---	17.0	11.5	22.0	16.0	24.0	19.0	23.5	21.0	16.5	13.0
9	---	---	16.5	11.5	20.5	17.5	22.0	18.0	22.0	19.0	18.0	14.0
10	---	---	18.5	13.5	18.0	16.5	22.5	19.0	19.0	17.0	18.0	15.0
11	---	---	20.0	15.0	19.5	14.5	21.5	18.0	18.5	15.0	20.0	16.5
12	5.5	4.0	20.0	16.5	18.5	16.0	22.0	16.0	19.0	14.5	20.0	17.0
13	6.0	5.5	21.0	16.0	20.0	15.5	22.5	17.5	19.5	15.0	20.5	18.0
14	8.0	4.0	20.0	16.5	20.5	15.5	23.0	19.0	19.0	16.5	20.0	18.0
15	10.5	7.0	19.5	17.5	19.5	16.0	23.5	19.0	20.5	17.0	18.0	15.5
16	10.5	9.5	21.5	16.5	16.0	15.0	24.5	20.0	21.5	17.0	15.5	13.5
17	10.5	8.5	21.5	17.0	15.5	14.0	25.0	21.0	21.5	18.0	13.5	12.5
18	10.5	6.5	22.0	17.5	15.5	15.0	24.0	19.5	20.5	16.5	14.0	12.5
19	11.5	8.5	21.5	18.0	16.5	14.0	21.0	20.0	21.5	18.0	13.0	11.0
20	11.0	7.5	21.0	17.0	17.0	15.0	21.5	20.5	22.0	19.0	13.0	12.0
21	9.5	5.5	18.5	15.0	17.0	15.0	21.5	20.0	21.0	17.0	12.0	11.0
22	10.5	6.5	17.0	13.0	17.0	14.5	22.5	20.5	---	---	11.5	10.5
23	12.5	8.0	13.0	12.5	17.5	14.0	23.5	20.5	---	---	13.5	11.0
24	14.0	9.5	13.5	12.5	17.5	14.5	23.5	20.0	---	---	13.0	12.5
25	14.0	11.0	17.5	13.0	17.5	16.0	23.0	20.5	---	---	14.0	12.5
26	13.0	11.5	16.5	14.0	18.5	15.0	22.5	20.5	---	---	14.0	13.0
27	13.0	9.0	17.0	15.0	18.0	16.5	20.5	19.0	---	---	---	---
28	14.0	9.0	17.0	15.5	21.5	17.0	21.0	18.0	---	---	---	---
29	14.0	9.5	19.5	16.0	21.0	18.0	21.0	18.0	---	---	---	---
30	13.0	11.0	21.5	18.5	20.0	15.5	21.5	19.0	---	---	---	---
31	---	---	21.5	19.5	---	---	21.5	18.5	---	---	---	---
MONTH			22.0	10.5	22.0	12.5	25.0	15.0				

04122000 MUSKEGON RIVER AT NEWAYGO, MI

LOCATION.--Lat 43°25'20", long 85°48'04", in NE¼ NE¼ sec.24, T.12 N., R.13 W., Newaygo County, Hydrologic Unit 04060102, on left bank near nonoperative powerplant at Newaygo, 600 ft (183 m) downstream from Penoyer Creek and at mile 39.1 (62.9 km).

DRAINAGE AREA.--2,350 mi² (6,090 km²), approximately.

PERIOD OF RECORD.--July to December 1908, July 1909 to July 1915, January 1916 to December 1919, October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307. Records for June 1901 to December 1906, published in WSP 129, 170, and 206, have been found to be unreliable and should not be used.

REVISED RECORDS.--WSP 974: 1933, 1935, 1937-38. WSP 1307: 1940(M). See also PERIOD OF RECORD.

GAGE.--Water-stage recorder. Datum of gage is 625.83 ft (190.753 m) National Geodetic Vertical Datum of 1929. October 1930 to January 1939, nonrecording gage, and Jan. 31, 1939, to Sept. 30, 1963, water-stage recorder at present site at datum 40.0 ft (12.192 m) lower.

REMARKS.--Records good except those for period of no gage-height record, July 15 to Sept. 30, which are fair. Flow regulated by powerplants above station, the largest of which are at Croton Dam, Hardy Dam (since 1931), and Rogers Dam. Since Dec. 27, 1965, powerplant at Newaygo nonoperative, and in January 1969, dam at Newaygo was removed. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--60 years (water years 1910-14, 1917-19, 1931-82), 1,961 ft³/s (55.54 m³/s), 11.33 in/yr (288 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 14,950 ft³/s (423 m³/s) Mar. 25, 1913; minimum, 52 ft³/s (1.47 m³/s) Oct. 2, 1965, gage height, 5.31 ft (1.618 m), result of regulation during pipeline repair; minimum daily, 330 ft³/s (9.35 m³/s) Feb. 15, 1914.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,590 ft³/s (158 m³/s) Apr. 3, gage height, 10.06 ft (3.066 m); minimum, 700 ft³/s (19.8 m³/s) Dec. 21, gage height, 6.40 ft (1.951 m), but may have been less during period of no gage-height record July 15 to Sept. 30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2690	1600	2920	1640	1950	2000	5230	2070	2650	1700	1700	1450
2	2910	1770	2850	1250	2300	2450	5170	1670	2170	1090	1350	1600
3	2450	1710	2960	1260	1700	2100	5520	2270	2960	1710	1900	1700
4	1760	1710	2890	2100	1800	1900	5500	2000	2590	1090	2300	1850
5	1910	2040	2780	1670	1800	2000	5320	2060	1090	1730	2250	1600
6	2010	1860	2480	2130	2200	1550	4870	2000	1630	1450	1500	1300
7	1790	1720	1820	2830	1850	2050	4900	1990	2550	1790	1350	1100
8	2430	1080	2390	3000	2500	1500	4910	2270	2070	1490	2100	1700
9	2350	1180	2630	1450	2000	2120	4890	1870	1570	1410	1500	1700
10	1340	1550	2620	2350	1850	2200	4790	2340	1980	1350	1100	1400
11	1330	2110	2540	1500	1800	2160	4440	2430	1730	1120	1100	1150
12	1530	2240	1180	2700	2000	2450	4120	1800	1370	1170	1100	1100
13	1800	1100	1110	1720	2300	2520	3430	1990	1060	1550	1100	1150
14	1820	1090	1750	1960	1900	2850	3180	1960	1540	1310	1100	1200
15	2030	1090	1980	1810	2050	3450	3660	1320	1660	1300	1150	1800
16	2060	1330	2040	2200	3750	3930	3730	1100	2310	1400	1250	2400
17	1500	1570	1880	2400	2000	3860	3730	1090	3220	1300	1250	2050
18	1930	1930	1920	1850	1550	3580	3730	1350	2180	2200	1450	2050
19	2840	1950	1200	1100	1700	3670	3730	1100	1860	3400	1200	2400
20	2640	2040	887	2250	1900	3590	3730	1080	2000	3500	1150	1700
21	2410	2050	915	2400	2050	3130	4010	1480	2340	3400	1150	1150
22	2070	1720	1410	3050	1950	3690	5070	1280	2530	2900	1100	1100
23	1820	1630	1990	2450	1800	3680	4300	1700	2930	1900	1100	1050
24	1800	1710	1830	2500	1800	3700	4100	1990	2060	1350	1100	980
25	1730	1760	1100	2050	1750	4190	4180	2510	2100	1120	1450	980
26	2120	1220	1100	1800	1550	4130	4320	2480	1790	1800	1200	1050
27	2240	2890	1500	1150	1400	4000	4230	2440	1720	2900	1150	1100
28	1860	3300	1970	2550	1300	4000	2690	2260	1810	2900	1400	1100
29	1850	3740	1790	1900	---	3840	3650	2340	1960	2400	1100	1100
30	1630	3150	1400	1800	---	3860	3080	1960	2050	1700	1600	1100
31	1580	---	1830	2550	---	5180	---	3120	---	1400	1900	---
TOTAL	62230	55840	59662	63370	54500	95330	128210	59320	61480	56830	43150	43110
MEAN	2007	1861	1925	2044	1946	3075	4274	1914	2049	1833	1392	1437
MAX	2910	3740	2960	3050	3750	5180	5520	3120	3220	3500	2300	2400
MIN	1330	1080	887	1100	1300	1500	2690	1080	1060	1090	1100	980
CFSM	.85	.79	.82	.87	.83	1.31	1.82	.81	.87	.78	.59	.61
IN.	.99	.88	.94	1.00	.86	1.51	2.03	.94	.97	.90	.68	.68

CAL YR 1981 TOTAL 706110 MEAN 1935 MAX 5270 MIN 666 CFSM .82 IN 11.18
WTR YR 1982 TOTAL 783032 MEAN 2145 MAX 5520 MIN 887 CFSM .91 IN 12.40

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI
(National stream-quality accounting network station)

LOCATION.--Lat 43°19'05", long 86°02'11", in SW¼ NW¼ sec.30, T.11 N., R.14 W., Newago County, Hydrologic Unit 04060102, at bridge on Maple Island Road, 5 mi (8 km) southwest of Bridgeton, 13 mi (21 km) upstream from Muskegon Lake, and 20 mi (32 km) downstream from gaging station at Newago.

DRAINAGE AREA.--2,420 mi² (6,270 km²), approximately.

PERIOD OF RECORD.--Water years 1974 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to September 1981.
WATER TEMPERATURES: November 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor November 1975 to September 1981.

REMARKS.--Bimonthly samples are collected as a cross-section sample at or near vicinity of Maple Island Road bridge. Water-discharge measurements are made at times of sampling. Some regulation by dams above station.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded (water years 1975, 1978-81), 1,550 micromhos Sept. 24, 1979; minimum (water years 1975, 1977-81), 69 micromhos May 3, 1979.
WATER TEMPERATURES: Maximum recorded, 33.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV												
12...	1130	2870	375	7.8	7.5	11.2	--	K8	26	160	11	43
JAN												
26...	1330	--	400	--	.0	12.8	89	K4	K22	170	19	43
MAR												
26...	1000	4530	382	7.5	2.0	12.4	91	--	K3	180	25	47
MAY												
12...	1300	1810	247	8.0	15.0	9.2	91	K18	80	110	13	31
JUL												
14...	1445	1160	340	8.3	23.0	8.7	104	290	170	150	18	41
SEP												
08...	1030	1340	357	7.9	18.5	9.5	101	65	450	170	17	45

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
NOV												
12...	13	9.4	11	.9	150	20	17	.1	4.5	222	203	.30
JAN												
26...	15	14	15	1.1	150	22	22	.1	7.2	242	215	.33
MAR												
26...	14	11	12	1.2	150	21	17	<.1	8.2	239	210	.33
MAY												
12...	8.6	5.5	9	1.4	100	13	8.8	<.1	5.0	154	134	.21
JUL												
14...	12	8.8	11	.9	130	25	2.4	.1	5.0	179	176	.24
SEP												
08...	13	9.6	11	.8	150	16	16	.2	5.5	188	190	.26

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV												
12...	1720	.30	<.010	.01	.42	.030	.09	.020	<.010	41	318	100
JAN												
26...	--	.53	.030	.04	.48	.030	.09	<.010	<.010	11	--	100
MAR												
26...	2920	.45	.120	.15	.37	.030	.09	.010	<.010	28	342	100
MAY												
12...	753	.14	.020	.03	1.60	.050	.15	.020	<.010	20	98	100
JUL												
14...	561	.16	.020	.03	.80	.020	.06	.010	<.010	9	28	100
SEP												
08...	680	.11	.020	.03	.70	.040	.12	.030	<.010	32	116	100

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
JAN										
26...	1330	1	1	<100	27	1	<1	<10	<10	<1
MAR										
26...	1000	1	1	<100	26	2	<1	10	<10	1
MAY										
12...	1300	1	<1	<100	22	1	<1	20	10	2
SEP										
08...	1030	2	2	100	24	1	<1	10	<10	2

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
JAN										
26...	<1	10	3	320	25	19	2	40	4	.1
MAR										
26...	<1	5	2	280	50	34	2	40	10	.1
MAY										
12...	<1	8	6	260	49	26	2	30	2	<.1
SEP										
08...	2	7	2	230	4	5	<1	40	4	<.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
JAN									
26...	<.1	4	<1	<1	<1	<1	<1	50	6
MAR									
26...	<.1	5	1	<1	<1	<1	<1	10	<4
MAY									
12...	<.1	7	<1	<1	<1	<1	<1	10	<3
SEP									
08...	<.1	6	1	<1	<1	<1	<1	20	<4

STREAMS TRIBUTARY TO LAKE MICHIGAN

04122100 BEAR CREEK NEAR MUSKEGON, MI

LOCATION.--Lat 43°17'19", long 86°13'22", in SW¼ NW¼ sec.4, T.10 N., R.16 W., Muskegon County, Hydrologic Unit 04060102, on left bank at upstream side of bridge on North Getty Street, 1.5 mi (2.4 km) upstream from Little Bear Creek, and 3.9 mi (6.3 km) northeast of Muskegon.

DRAINAGE AREA.--14.8 mi² (38.3 km²).

PERIOD OF RECORD.--October 1965 to current year.

REVISED RECORDS.--WDR MI-80-1: 1976 (M), 1978 (M), 1979 (P).

GAGE.--Water-stage recorder. Datum of gage is 590.00 ft (179.832 m) Michigan Department of Natural Resources datum. Prior to Mar. 17, 1978, at different datum.

REMARKS.--Records good except those for the winter period, which are poor. Some regulation during low flow by dams and irrigation above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--17 years, 16.4 ft³/s (0.464 m³/s), 15.05 in/yr (382 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 930 ft³/s (26.3 m³/s) Mar. 5, 1976, gage height, 11.00 ft (3.353 m), datum then in use; minimum, 1.0 ft³/s (0.028 m³/s) Aug. 5, 17, 22, 1971.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft³/s (2.83 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	1100	*410	11.6	*16.05	4.892	Apr. 13	1600	130	3.68	14.19	4.325
Nov. 27	1100	111	3.14	14.03	4.276	Apr. 17	0100	257	7.28	15.19	4.630
Mar. 15	0500	142	4.02	14.32	4.365	Aug. 2	1900	108	3.06	13.66	4.164

Minimum discharge, 4.7 ft³/s (0.13 m³/s) Sept. 13; minimum gage height, 10.32 ft (3.146 m) July 29, 30, 31, Aug. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	346	17	33	14	14	10	41	20	30	13	6.3	12
2	135	16	53	14	14	10	33	18	25	13	56	14
3	56	15	42	18	14	10	56	18	21	13	46	12
4	39	15	33	26	14	10	37	17	19	9.4	53	10
5	34	15	28	30	14	10	46	19	17	8.3	41	9.2
6	43	20	25	27	14	10	55	20	16	7.4	25	8.4
7	41	18	24	25	14	10	48	19	14	9.9	19	8.0
8	31	16	22	23	14	10	40	19	15	7.9	20	7.4
9	27	15	20	21	14	10	39	18	14	7.4	16	7.1
10	25	14	19	19	14	10	50	17	16	8.8	14	6.8
11	23	14	18	18	14	13	48	16	14	12	12	6.5
12	21	13	17	16	14	18	57	18	13	10	11	6.2
13	20	13	17	15	14	53	106	17	16	8.6	10	6.2
14	22	13	17	14	14	103	85	15	14	8.6	9.6	6.8
15	35	13	16	14	14	120	55	17	26	8.1	8.8	6.8
16	32	13	15	14	14	117	72	35	40	6.9	8.2	6.8
17	30	13	15	14	12	111	175	25	27	8.8	7.6	7.8
18	67	12	15	14	11	82	79	20	24	22	7.0	13
19	68	12	15	14	10	74	51	21	23	19	7.2	9.3
20	45	18	15	14	10	59	53	19	22	13	8.1	11
21	35	22	15	14	10	57	46	17	23	10	7.0	8.6
22	31	22	15	14	10	52	38	20	20	9.3	7.1	7.9
23	28	21	16	14	10	54	33	21	17	8.8	8.0	7.1
24	25	19	15	14	10	57	30	20	16	7.7	7.4	7.1
25	24	18	14	14	10	54	28	19	18	7.6	9.7	7.0
26	22	25	14	14	10	41	26	17	24	7.3	8.4	7.1
27	21	89	14	14	10	33	25	24	19	7.7	6.9	6.9
28	19	55	13	14	10	30	23	50	17	7.2	6.6	6.5
29	19	37	13	14	---	28	21	38	15	6.8	11	6.3
30	18	30	13	14	---	33	21	32	14	6.7	20	6.1
31	17	---	13	14	---	52	---	28	---	6.6	13	---
TOTAL	1399	633	614	518	347	1341	1517	674	589	300.8	490.9	245.9
MEAN	45.1	21.1	19.8	16.7	12.4	43.3	50.6	21.7	19.6	9.70	15.8	8.20
MAX	346	89	53	30	14	120	175	50	40	22	56	14
MIN	17	12	13	14	10	10	21	15	13	6.6	6.3	6.1
CFSM	3.05	1.43	1.34	1.13	.84	2.93	3.42	1.47	1.32	.66	1.07	.55
IN.	3.52	1.59	1.54	1.30	.87	3.37	3.81	1.69	1.48	.76	1.23	.62

CAL YR 1981 TOTAL 7621.7 MEAN 20.9 MAX 346 MIN 3.7 CFSM 1.41 IN 19.16
WTR YR 1982 TOTAL 8669.6 MEAN 23.8 MAX 346 MIN 6.1 CFSM 1.61 IN 21.79

04122200 WHITE RIVER NEAR WHITEHALL, MI

LOCATION.--Lat 43°27'51", long 86°13'57", in SE¼ NW¼ sec.4, T.12 N., R.16 W., Muskegon County, Hydrologic Unit 04060101, on right bank 30 ft (9 m) downstream from bridge on Fruitvale Road, 6.3 mi (10.1 km) downstream from North Branch, and 6.9 mi (11.1 km) northeast of Whitehall.

DRAINAGE AREA.--380 mi² (980 km²), approximately.

PERIOD OF RECORD.--August 1957 to current year.

GAGE.--Water-stage recorder. Datum of gage is 594.1 ft (181.1 m) National Geodetic Vertical Datum of 1929. Nov. 18, 1957, to Oct. 22, 1958, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Some regulation during low flow by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 429 ft³/s (12.15 m³/s) 15.33 in/yr (389 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,400 ft³/s (153 m³/s) Sept. 1, 1975, gage height, 7.46 ft (2.274 m); minimum, 163 ft³/s (4.62 m³/s) Aug. 18, 19, 1958.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,700 ft³/s (76.5 m³/s) Apr. 17, gage height, 6.38 ft (1.945 m); minimum, 312 ft³/s (8.84 m³/s) Nov. 18; minimum gage height, 2.05 ft (0.625 m) Aug. 22.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	518	342	636	360	355	350	965	601	751	444	455	410
2	663	339	615	360	355	350	949	581	758	424	505	418
3	799	333	663	370	350	340	910	567	711	410	772	426
4	666	331	723	410	350	350	1030	556	639	400	960	424
5	565	332	667	450	350	375	992	541	554	391	921	405
6	484	341	616	460	350	410	955	523	490	386	892	392
7	423	347	576	440	350	400	954	513	460	385	722	388
8	399	342	538	410	350	380	830	508	454	383	627	380
9	388	335	505	400	350	365	781	500	445	375	559	369
10	371	327	483	385	350	370	762	490	439	374	479	363
11	356	322	458	370	350	380	769	482	440	413	441	359
12	345	318	429	365	350	384	757	484	427	472	418	356
13	338	315	418	365	355	451	780	487	428	446	404	354
14	337	314	410	360	355	566	1050	485	431	408	394	356
15	363	314	408	360	355	824	1150	477	452	386	387	360
16	388	313	402	360	355	1050	1060	516	541	372	380	377
17	393	314	396	360	355	986	2110	584	687	373	371	411
18	425	313	389	360	355	981	2180	580	738	435	362	426
19	493	315	392	360	360	974	1570	527	703	591	358	433
20	588	335	400	360	360	940	1330	499	697	1090	356	438
21	580	354	450	360	360	902	1230	478	645	1110	355	430
22	515	378	460	360	360	870	1110	471	617	919	357	414
23	458	386	450	360	360	872	965	482	580	845	374	401
24	420	381	420	360	360	950	875	513	530	723	377	395
25	400	371	390	360	360	1070	813	559	492	545	414	397
26	387	379	380	360	350	1120	750	571	501	460	409	400
27	376	438	370	355	360	982	699	551	548	486	388	391
28	365	576	365	355	360	864	668	575	537	543	369	387
29	357	797	365	355	---	782	642	618	505	563	370	382
30	351	701	360	360	---	743	620	617	469	544	408	375
31	347	---	360	360	---	765	---	622	---	507	425	---
TOTAL	13858	11303	14494	11610	9930	21166	30256	16558	16669	16203	15009	11817
MEAN	447	377	468	375	355	683	1009	534	556	523	484	394
MAX	799	797	723	460	360	1120	2180	622	758	1110	960	438
MIN	337	313	360	355	350	340	620	471	427	372	355	354
CFSM	1.18	.99	1.23	.99	.93	1.80	2.66	1.41	1.46	1.38	1.27	1.04
IN.	1.36	1.11	1.42	1.14	.97	2.07	2.96	1.62	1.63	1.59	1.47	1.16

CAL YR 1981 TOTAL 150161 MEAN 411 MAX 1220 MIN 228 CFSM 1.08 IN 14.70
WTR YR 1982 TOTAL 188873 MEAN 517 MAX 2180 MIN 313 CFSM 1.36 IN 18.49

04122500 PERE MARQUETTE RIVER AT SCOTTVILLE, MI

LOCATION.--Lat 43°56'42", long 86°16'43", in NW¼ NW¼ sec.19, T.18 N., R.16 W., Mason County, Hydrologic Unit 04060101, on right bank 20 ft (6 m) upstream from highway bridge at south edge of Scottville, 1.4 mi (2.3 km) upstream from India Creek and 5.6 mi (9.0 km) downstream from Big South Branch.

DRAINAGE AREA.--681 mi² (1,764 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1939 to current year. Prior to October 1942, published as "at Custer".

REVISED RECORDS.--WSP 1437: 1941(M), 1943(M), 1949(M), 1950. WDR MI-81: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 597.66 ft (182.167 m) National Geodetic Vertical Datum of 1929. Prior to June 12, 1943, nonrecording gage at bridge 4.5 mi (7.2 km) upstream at different datum.

REMARKS.--Water-discharge records good except those for the winter period and those for the period of no gage-height record, Jan. 15 to Feb. 19, which are poor. Some regulation at low flow.

AVERAGE DISCHARGE.--43 years, 664 ft³/s (18.80 m³/s), 13.24 in/yr (336 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,970 ft³/s (84.1 m³/s) July 1, 1969, gage height, 6.26 ft (1.908 m); minimum, 209 ft³/s (5.92 m³/s) Dec. 11, 1962, discharge measurement; minimum daily, 310 ft³/s (8.78 m³/s) Aug. 9, 10, 1941.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,880 ft³/s (81.6 m³/s) Apr. 19, gage height, 5.78 ft (1.762 m); minimum, 464 ft³/s (13.1 m³/s) Sept. 13; minimum gage height, 1.98 ft (0.604 m) Aug. 20-22, Sept. 13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	627	561	921	540	540	584	1590	970	859	655	662	596
2	680	553	895	540	540	569	1670	928	831	617	634	647
3	725	547	896	580	540	539	1890	895	807	590	667	689
4	701	540	928	660	540	518	1910	867	767	572	783	717
5	641	540	958	700	540	520	1730	839	718	560	856	707
6	617	559	936	720	550	560	1650	823	683	548	920	637
7	609	561	886	670	550	640	1510	803	662	539	951	592
8	605	572	838	640	550	710	1420	785	648	527	890	565
9	598	559	801	600	550	690	1340	767	634	515	766	545
10	567	547	778	580	550	630	1340	753	631	518	701	528
11	542	539	741	560	560	570	1360	739	627	605	650	512
12	527	536	688	550	560	551	1340	764	620	655	618	499
13	516	530	653	550	560	686	1360	750	602	676	597	487
14	518	524	648	550	560	799	1400	739	587	631	579	513
15	555	521	636	540	560	915	1440	732	614	575	560	568
16	570	518	622	540	570	985	1620	753	652	548	548	627
17	600	515	607	540	570	1040	1860	756	708	539	535	672
18	726	513	621	540	580	1110	2270	760	750	701	525	667
19	808	512	639	540	580	1160	2840	736	743	807	516	667
20	869	539	664	540	580	1210	2660	711	756	903	515	696
21	903	559	948	540	590	1270	2280	694	778	1080	501	674
22	870	554	1050	540	590	1300	1990	701	750	1130	499	651
23	784	573	847	540	600	1330	1800	756	711	938	505	628
24	721	585	634	540	602	1540	1610	803	683	795	521	617
25	683	588	592	540	578	1910	1450	823	694	711	603	598
26	660	600	570	540	530	1940	1320	811	725	770	620	587
27	639	712	573	540	572	1860	1220	792	760	903	631	582
28	616	795	566	540	596	1710	1140	811	803	942	573	572
29	599	869	558	540	---	1510	1070	839	764	871	538	560
30	584	927	552	550	---	1410	1020	871	708	778	550	548
31	575	---	548	550	---	1470	---	871	---	708	556	---
TOTAL	20235	17548	22794	17640	15788	32236	49100	24642	21275	21907	19570	18148
MEAN	653	585	735	569	564	1040	1637	795	709	707	631	605
MAX	903	927	1050	720	602	1940	2840	970	859	1130	951	717
MIN	516	512	548	540	530	518	1020	694	587	515	499	487
CFSM	.96	.86	1.08	.84	.83	1.53	2.40	1.17	1.04	1.04	.93	.89
IN.	1.11	.96	1.25	.96	.86	1.76	2.68	1.35	1.16	1.20	1.07	.99

CAL YR 1981 TOTAL 243398 MEAN 667 MAX 1880 MIN 360 CFSM .98 IN 13.30
WTR YR 1982 TOTAL 280883 MEAN 770 MAX 2840 MIN 487 CFSM 1.13 IN 15.34

04122500 PERE MARQUETTE RIVER AT SCOTTVILLE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: May 1968 to current year.

INSTRUMENTATION.--Temperature recorder since May 1968.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 25.0°C July 20, 21, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 22.0°C Aug. 2-4; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	11.5	10.5	10.0	9.5	2.0	2.0	.5	.0	.0	.0	1.5	1.0
2	10.5	9.5	10.0	9.0	2.5	2.0	.0	.0	.0	.0	1.5	1.5
3	9.5	8.0	9.0	8.0	3.0	2.5	.0	.0	.0	.0	1.5	.0
4	9.0	8.5	8.5	8.0	3.0	3.0	.0	.0	.0	.0	.0	.0
5	10.0	8.5	9.0	8.5	3.0	2.5	.0	.0	.0	.0	.0	.0
6	10.0	10.0	9.0	8.0	2.5	2.5	.0	.0	.0	.0	.0	.0
7	10.5	10.5	8.0	6.5	3.0	2.5	.0	.0	.0	.0	.0	.0
8	10.5	9.0	6.5	6.0	3.0	3.0	.0	.0	.0	.0	.0	.0
9	9.5	8.5	6.5	5.5	3.0	2.5	.0	.0	.0	.0	.0	.0
10	10.0	9.5	5.5	4.5	2.5	1.5	.0	.0	.0	.0	.0	.0
11	10.0	9.5	4.5	4.5	1.5	1.5	.0	.0	.0	.0	1.0	.0
12	10.0	9.0	4.5	4.0	1.5	1.5	.0	.0	.0	.0	2.0	.5
13	10.5	9.5	4.0	3.5	2.0	1.5	.0	.0	.0	.0	2.0	2.0
14	10.5	10.5	4.0	3.5	2.0	2.0	.0	.0	.0	.0	2.0	1.5
15	11.0	10.5	4.0	4.0	2.0	2.0	.0	.0	.0	.0	2.0	1.5
16	11.0	10.0	4.5	4.0	2.0	1.5	.0	.0	.0	.0	1.5	1.5
17	10.0	9.5	5.0	4.0	1.5	1.0	.0	.0	.0	.0	1.5	1.5
18	10.0	9.5	5.0	5.0	1.0	1.0	.0	.0	.0	.0	1.5	1.5
19	9.5	8.5	5.0	5.0	1.0	1.0	.0	.0	.0	.0	2.0	1.5
20	9.0	8.0	5.0	3.0	1.0	1.0	.0	.0	.0	.0	1.5	1.5
21	9.0	8.5	3.0	2.5	1.0	.5	.0	.0	.0	.0	1.5	1.5
22	8.5	7.0	2.5	2.5	.5	.0	.0	.0	.5	.0	3.0	1.5
23	7.0	6.0	2.5	2.0	.0	.0	.0	.0	1.5	.5	3.5	2.0
24	6.0	5.5	2.0	1.5	.0	.0	.0	.0	1.5	1.5	4.5	3.5
25	5.5	5.5	1.5	1.0	.0	.0	.0	.0	1.5	.0	4.0	3.0
26	7.0	5.5	1.5	1.0	.0	.0	.0	.0	.0	.0	3.0	2.5
27	7.5	7.0	2.0	1.5	.5	.0	.0	.0	.5	.0	2.5	1.5
28	7.5	7.0	2.0	2.0	.5	.5	.0	.0	1.0	.0	2.5	1.5
29	8.0	7.5	2.0	2.0	.5	.5	.0	.0	---	---	4.5	2.5
30	8.5	7.5	2.0	2.0	.5	.5	.0	.0	---	---	5.0	4.5
31	9.5	8.5	---	---	.5	.5	.0	.0	---	---	5.0	5.0
MONTH	11.5	5.5	10.0	1.0	3.0	.0	.5	.0	1.5	.0	5.0	.0

04122500 BEAR MARQUETTE RIVER AT SCOTTVILLE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	6.0	4.5	14.5	12.0	18.5	17.0	18.0	16.0	21.5	20.5	16.0	15.0
2	6.0	4.5	15.0	12.5	17.5	16.0	18.5	16.5	22.0	21.0	16.5	16.0
3	4.5	2.0	16.0	13.5	17.0	15.0	19.0	18.0	22.0	21.0	16.5	15.5
4	2.0	1.0	16.5	14.5	16.5	14.5	19.5	18.5	22.0	21.0	15.5	14.5
5	1.0	1.0	16.5	15.5	16.5	14.5	21.0	19.0	21.0	21.0	15.0	14.5
6	2.0	1.0	17.0	15.5	17.0	15.0	21.0	21.0	21.0	20.0	15.0	15.0
7	2.5	1.5	17.0	15.5	17.0	16.0	21.0	20.0	21.5	20.5	15.0	14.0
8	3.5	1.5	16.5	14.0	18.5	16.5	21.0	19.0	21.5	21.0	15.0	14.0
9	5.5	3.0	16.5	14.0	18.5	17.0	20.0	18.0	21.5	20.0	16.0	14.5
10	5.5	4.0	17.0	14.5	17.0	16.5	19.5	18.5	20.5	19.5	16.5	15.5
11	5.0	4.0	18.0	16.0	17.5	15.5	19.0	18.0	20.0	18.5	18.0	16.5
12	5.0	4.5	19.0	17.0	18.0	16.5	20.0	18.0	19.0	17.5	18.5	18.0
13	6.0	5.0	19.5	17.5	18.0	16.5	21.0	19.0	19.0	17.5	19.0	18.5
14	7.5	5.0	19.5	18.5	18.5	16.5	21.5	20.0	19.0	18.5	19.0	18.0
15	9.5	7.5	20.0	19.0	18.5	16.5	21.5	20.0	19.5	18.5	18.0	16.0
16	9.5	9.5	20.0	18.5	16.5	15.0	21.0	20.5	20.5	19.0	16.0	15.5
17	9.5	9.0	20.0	18.5	16.0	14.0	21.5	21.0	21.0	20.0	15.5	14.0
18	10.0	8.0	20.0	18.0	14.5	14.0	21.5	19.0	21.0	18.5	14.0	13.0
19	10.0	10.0	20.0	18.5	16.0	13.5	19.5	18.5	20.5	19.5	13.5	12.0
20	10.0	9.0	19.5	18.0	16.0	15.0	20.0	18.5	21.0	20.0	13.0	12.5
21	9.0	8.0	18.0	15.5	15.0	14.5	20.0	18.5	21.0	19.5	12.5	12.0
22	9.5	8.5	17.0	15.0	16.0	14.0	20.0	19.5	20.0	18.5	12.0	11.0
23	11.0	9.5	15.0	14.0	16.5	14.5	20.0	19.0	18.5	17.5	12.5	11.5
24	13.0	11.0	15.0	13.5	16.5	15.0	21.0	19.5	18.0	17.0	12.5	12.5
25	14.0	12.5	16.0	14.0	16.5	15.5	21.5	20.0	18.0	16.5	12.5	12.5
26	14.0	11.5	16.0	15.0	16.5	14.5	21.5	20.5	18.0	17.0	12.5	12.5
27	12.0	10.0	16.0	15.5	16.5	15.5	21.0	19.5	18.0	18.0	12.5	12.5
28	12.5	10.0	16.0	15.5	18.5	16.0	20.0	19.0	18.0	16.0	13.0	12.5
29	13.0	10.5	17.5	15.5	18.5	17.5	21.0	19.5	16.5	14.5	14.5	13.0
30	13.0	12.0	19.0	17.0	17.5	16.0	21.0	20.0	15.0	14.0	15.0	14.0
31	---	---	19.0	18.0	---	---	21.5	20.5	15.0	14.0	---	---
MONTH	14.0	1.0	20.0	12.0	18.5	13.5	21.5	16.0	22.0	14.0	19.0	11.0

04124000 MANISTEE RIVER NEAR SHERMAN, MI

LOCATION.--Lat 44°26'11", long 85°41'55", in NE¼ NE¼ sec.36, T.24 N., R.12 W., Wexford County, Hydrologic Unit 04060103, on downstream side of bridge near right pier on State Highway 37, 250 ft (76 m) upstream from Wheeler Creek, 0.9 mi (1.4 km) north of Sherman, and at mile 60.8 (97.8 km).

DRAINAGE AREA.--900 mi² (2,331 km²).

PERIOD OF RECORD.--July 1903 to May 1916, October 1930 to September 1931, October 1933 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1004: 1936(m). WSP 1307: 1911, 1913-14(M), 1934(M), 1936(M), 1937, 1939-40(M). WSP 1437: 1911, 1913(M), 1937.

GAGE.--Nonrecording gage. Altitude of gage is 804 ft (245 m), from river-profile map. Prior to Apr. 13, 1934, at various datums.

REMARKS.--Records fair except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--62 years (water years 1904-15, 1931, 1934-82), 1,053 ft³/s (29.82 m³/s), 15.89 in/yr (404 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,570 ft³/s (101 m³/s) Mar. 25, 1913, gage height, 7.1 ft (2.16 m), from graph based on gage readings, datum then in use; minimum daily, 540 ft³/s (15.3 m³/s) Feb. 21-23, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,770 ft³/s (78.4 m³/s) Apr. 21, gage height, 14.89 ft (4.538 m); minimum, 670 ft³/s (19.0 m³/s) Aug. 11, gage height, 10.40 ft (3.170 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	790	855	1150	810	830	800	1420	1300	1050	900	781	757
2	814	855	1150	810	820	800	1700	1280	1030	872	799	736
3	790	760	1060	810	800	790	2020	1270	960	820	811	733
4	781	724	1000	810	770	780	1940	1280	996	799	760	775
5	769	700	960	800	780	780	1630	1200	940	751	721	787
6	742	760	922	820	800	780	1460	1180	925	820	760	848
7	772	760	925	800	820	790	1310	1190	890	805	733	781
8	763	772	922	770	790	780	1090	1190	820	781	751	730
9	772	784	908	790	750	790	1050	1200	781	730	781	757
10	793	827	908	800	750	790	960	1180	802	766	718	760
11	802	834	897	810	760	800	1020	1140	869	827	700	760
12	814	781	880	800	760	840	1140	1110	870	858	703	760
13	796	778	870	800	760	860	1280	1070	870	820	769	780
14	790	763	850	800	770	900	1360	1020	870	796	760	824
15	787	830	830	790	770	950	1380	950	860	793	769	787
16	814	817	830	790	780	956	1500	940	890	830	790	805
17	834	820	830	790	790	980	1900	960	940	1020	769	778
18	904	787	830	790	800	1000	2400	1030	960	1100	766	730
19	1040	751	840	790	820	972	2490	980	960	1130	790	733
20	1080	781	840	780	840	939	2560	930	960	1150	727	763
21	1000	787	840	790	840	960	2730	950	1020	1140	733	733
22	1010	787	840	800	810	968	2590	1020	1050	1020	763	778
23	890	754	820	810	790	1080	2220	1090	980	925	763	763
24	900	730	820	810	780	1090	2120	1000	900	925	784	721
25	910	751	800	810	780	1120	1840	950	870	922	796	754
26	880	787	800	810	800	1120	1620	900	860	886	820	778
27	860	802	800	800	800	1040	1550	980	860	925	852	736
28	820	748	800	800	800	988	1510	1040	860	817	890	799
29	840	763	810	810	---	1080	1520	1050	870	718	827	824
30	860	751	827	820	---	1130	1400	1080	890	736	778	763
31	880	---	820	830	---	1200	---	1070	---	796	733	---
TOTAL	26297	23399	27379	24850	22160	28853	50710	33530	27403	27178	23897	23033
MEAN	848	780	883	802	791	931	1690	1082	913	877	771	768
MAX	1080	855	1150	830	840	1200	2730	1300	1050	1150	890	848
MIN	742	700	800	770	750	780	960	900	781	718	700	721
CFSM	.94	.87	.98	.89	.88	1.03	1.88	1.20	1.01	.97	.86	.85
IN.	1.09	.97	1.13	1.03	.92	1.19	2.10	1.39	1.13	1.12	.99	.95

CAL YR 1981 TOTAL 345741 MEAN 947 MAX 1650 MIN 656 CFSM 1.05 IN 14.29
WTR YR 1982 TOTAL 338689 MEAN 928 MAX 2730 MIN 700 CFSM 1.03 IN 14.00

04125500 PINE RIVER NEAR HOXEYVILLE, MI

LOCATION.--Lat 44°12'11", long 85°47'58", in SW¼ NW¼ sec.20, T.21 N., R.12 W., Wexford County, Hydrologic Unit 04060103, on right bank 500 ft (152 m) upstream from bridge on State Highway 37, 4.2 mi (6.8 km) northwest of Hoxeyville, 8.0 mi (12.9 km) east of Wellston, and 8.0 mi (12.9 km) upstream from mouth.

DRAINAGE AREA.--251 mi² (650 km²).

PERIOD OF RECORD.--July 1952 to September 1982 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 775 ft (236 m), by barometer.

REMARKS.--Records good except those for period of no gage-height record, Oct. 1 to June 14, which are poor. Some regulation during low flows by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--30 years, 288 ft³/s (8.156 m³/s), 15.58 in/yr (396 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,440 ft³/s (69.1 m³/s) Aug. 6, 1956, gage height, 6.82 ft (2.079 m), from rating curve extended above 1,100 ft³/s (31.2 m³/s); minimum, 161 ft³/s (4.56 m³/s) Feb. 2, 1961.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 650 ft³/s (18.4 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Apr. 2	unknown	1,000	28.3	unknown		Apr. 18	unknown	*1,690	47.9	*4.91	1.497

Minimum discharge recorded, 224 ft³/s (6.34 m³/s) Aug. 11, 12, 13, 18, gage height, 1.82 ft (0.555 m), but may have been less during period of no gage-height record Oct. 1 to June 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	250	242	280	250	248	240	862	300	315	254	231	251
2	270	242	345	240	245	235	900	295	300	248	229	292
3	280	240	360	270	245	230	810	292	285	244	230	288
4	275	240	340	270	242	230	700	292	275	241	234	266
5	270	240	320	265	240	230	620	292	265	238	231	253
6	290	260	300	250	240	230	550	292	255	235	233	246
7	300	260	290	245	240	230	500	290	247	241	233	241
8	295	260	287	240	240	225	460	285	250	239	232	238
9	290	260	290	235	240	225	420	280	260	233	229	236
10	280	255	290	230	240	225	410	275	265	237	229	233
11	280	250	285	230	240	225	420	270	260	273	226	232
12	275	245	280	235	240	230	440	287	240	270	225	231
13	270	245	270	235	240	245	480	300	255	255	225	233
14	270	245	270	235	240	270	560	290	247	244	227	248
15	280	245	270	235	240	335	700	280	256	246	229	268
16	290	242	265	240	240	380	920	280	283	252	229	276
17	320	240	260	240	240	400	1200	278	278	246	229	261
18	390	240	250	240	240	360	1500	275	262	357	226	262
19	450	240	252	238	240	310	980	273	281	371	227	265
20	430	245	255	238	240	280	790	272	285	306	229	262
21	360	250	260	238	240	290	670	270	295	268	227	264
22	330	250	260	240	240	315	580	290	315	251	229	260
23	305	245	260	240	240	340	470	350	277	245	234	253
24	280	240	260	240	242	370	420	370	263	240	238	251
25	270	240	260	240	235	350	385	340	281	236	286	254
26	260	260	260	245	231	330	365	315	326	238	299	256
27	255	325	260	245	249	320	340	300	307	240	256	252
28	250	340	255	247	240	340	330	300	279	246	241	249
29	250	320	255	248	---	430	315	305	267	239	238	247
30	245	295	255	250	---	520	305	300	260	234	242	243
31	245	---	255	250	---	680	---	295	---	232	246	---
TOTAL	9105	7701	8599	7544	6737	9620	18402	9133	8234	7899	7319	7611
MEAN	294	257	277	243	241	310	613	295	274	255	236	254
MAX	450	340	360	270	249	680	1500	370	326	371	299	292
MIN	245	240	250	230	231	225	305	270	240	232	225	231
CFSM	1.17	1.02	1.10	.97	.96	1.24	2.44	1.18	1.09	1.02	.94	1.01
IN.	1.35	1.14	1.27	1.12	1.00	1.43	2.73	1.35	1.22	1.17	1.08	1.13

CAL YR 1981 TOTAL 103510 MEAN 284 MAX 770 MIN 218 CFSM 1.13 IN 15.34
WTR YR 1982 TOTAL 107904 MEAN 296 MAX 1500 MIN 225 CFSM 1.18 IN 15.99

04126000 MANISTEE RIVER NEAR MANISTEE, MI

LOCATION.--Lat 44°16'14", long 86°11'56", in NW¼ NW¼ sec.36, T.22 N., R.16 W., Manistee County, Hydrologic Unit 04060103, on right bank 6.4 mi (10.3 km) northeast of Manistee, 7.8 mi (12.6 km) upstream from Manistee Lake, and at mile 10.8 (17.4 km).

DRAINAGE AREA.--1,780 mi² (4,610 km²), approximately.

PERIOD OF RECORD.--October 1951 to current year. Monthly discharge only for October, November, 1951, published in WSP 1727.

GAGE.--Water-stage recorder. Altitude of gage is 585 ft (178 m), from river-profile map.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated at all stages by Tippy hydroelectric powerplant 21 mi (34 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--31 years, 1,996 ft³/s (56.53 m³/s), 15.23 in/yr (387 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,120 ft³/s (202 m³/s) Mar. 30, 1976, gage height, 8.37 ft (2.551 m); maximum gage height, 9.15 ft (2.789 m) Feb. 12, 1955, backwater from ice; minimum daily discharge, 570 ft³/s (16.1 m³/s) June 18, 1980.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,540 ft³/s (157 m³/s) Apr. 19, gage height, 7.93 ft (2.417 m); maximum gage height, 8.50 ft (2.591 m) Jan. 16, backwater from ice; minimum discharge, 680 ft³/s (19.3 m³/s) July 10, gage height, 3.50 ft (1.067 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1840	1400	2010	1940	1400	1480	3830	2610	1800	1850	1630	1780
2	2100	1430	2030	1900	2000	1890	4320	2230	2250	1920	1120	1850
3	1880	1960	2380	1720	2100	1820	5120	2040	2090	1510	2130	1900
4	1330	1660	2040	1300	2050	1740	5130	2510	2250	1330	2430	1840
5	1270	1590	2080	1600	2000	1900	4780	2510	1760	1380	2200	1290
6	1850	1990	1850	1810	1800	1660	3720	2430	1390	1610	2220	1540
7	1890	1890	1560	1860	1450	1330	3440	2220	1550	1950	1320	1720
8	1690	1450	1910	1800	1350	1530	3120	2330	2090	1950	1560	1720
9	1830	1600	2030	1600	1800	1870	3310	1620	2040	1740	1410	1490
10	2030	1570	1910	1250	1750	1680	3050	1950	2000	1430	1190	1480
11	1260	1660	1870	1330	1550	1750	2760	1990	2200	1070	2400	1520
12	1290	1610	1790	1300	1800	2060	2740	1930	1270	1600	1280	1500
13	1670	1870	1380	1450	1900	1980	2850	2510	1170	2490	1280	1710
14	1620	1620	1350	1700	1600	2300	2780	2250	1750	1820	1450	1780
15	1730	1380	2050	2120	1350	1930	3200	2350	1840	1660	1210	1800
16	1930	1070	1920	1900	1650	2610	3510	1570	1980	1750	1240	1690
17	1650	1700	1780	1500	2300	2330	3660	2170	2150	1860	1720	1730
18	1830	1670	1740	1100	2250	2410	3940	2060	1920	2240	1670	1780
19	2370	1760	1410	1950	2000	2300	5250	2200	1990	3120	1590	1740
20	3030	1710	1460	1800	1800	2210	4730	3100	1720	2940	1590	1560
21	2830	1920	1290	2450	2000	2190	4740	2040	1700	2500	1980	1790
22	2340	1440	2000	1900	1800	2230	4770	1770	2370	2390	1410	1890
23	2160	1290	1860	2050	1950	2250	4710	1840	2290	2380	1160	1940
24	1680	1840	1980	1500	2210	2150	3830	1710	1960	2380	1710	1960
25	1600	1730	1660	1400	2090	3230	3710	2090	2010	1200	1830	1900
26	2140	1660	1480	1850	1860	3500	3010	2240	2020	1320	1660	1380
27	1890	2050	1670	2050	1940	3340	2820	2180	1570	2290	1690	1240
28	1580	2290	1470	1900	1290	2800	3080	2260	1470	1410	1740	1710
29	1980	2160	2030	1700	---	2540	2850	2240	1970	1910	1480	2050
30	1610	2270	1860	1700	---	2530	2830	1900	2140	1870	1390	2100
31	1660	---	1780	1600	---	3050	---	1840	---	2090	1770	---
TOTAL	57560	51240	55630	53030	51040	68680	111590	66690	56710	58960	50460	51380
MEAN	1857	1708	1795	1711	1823	2215	3720	2151	1890	1902	1628	1713
MAX	3030	2290	2380	2450	2300	3500	5250	3100	2370	3120	2430	2100
MIN	1260	1070	1290	1100	1290	1330	2740	1570	1170	1070	1120	1240
CFSM	1.04	.96	1.01	.96	1.02	1.24	2.09	1.21	1.06	1.07	.92	.96
IN.	1.20	1.07	1.16	1.11	1.07	1.44	2.33	1.39	1.19	1.23	1.05	1.07

CAL YR 1981 TOTAL 668190 MEAN 1831 MAX 3310 MIN 960 CFSM 1.03 IN 13.96
WTR YR 1982 TOTAL 732970 MEAN 2008 MAX 5250 MIN 1070 CFSM 1.13 IN 15.32

04126520 MANISTEE RIVER AT MANISTEE, MI
(National stream-quality accounting network and pesticide station)

LOCATION.--Lat 44°15'02", long 86°19'09", in SW¼ SW¼ sec.1, T.21 N., R.17 W., Manistee County, Hydrologic Unit 04060103, at upstream side of bridge on U.S. Highway 31, in Manistee, and 1.3 mi (2.1 km) upstream from mouth.

DRAINAGE AREA.--2,000 mi² (5,180 km²), approximately.

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to September 1981.
WATER TEMPERATURES: November 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor March 1977 to September 1981.

REMARKS.--Bimonthly samples are collected as a cross-section sample at Washington Street bridge. Water-discharge measurements are made at times of sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 1,680 micromhos Nov. 18, 1974; minimum daily, 226 micromhos Apr. 22, 1980.
WATER TEMPERATURES: Maximum, 26.5°C July 8, 1981, minimum 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV												
25...	1145	2300	385	8.1	3.0	12.3	92	K63	K16	180	26	49
JAN												
13...	0900	--	421	7.8	.0	--	--	100	57	170	19	48
MAR												
03...	1330	1290	485	7.8	.0	11.5	79	120	120	190	43	56
MAY												
11...	1300	2250	316	8.2	15.5	--	--	K62	K50	140	12	38
JUL												
13...	1215	2110	363	8.2	20.5	8.3	92	1100	120	160	11	44
SEP												
09...	1000	1290	411	8.2	18.5	9.3	99	430	96	180	26	51

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
NOV												
25...	13	13	14	1.0	150	15	27	.1	8.7	232	217	.32
JAN												
13...	12	14	15	2.2	150	15	34	.1	8.2	250	224	.34
MAR												
03...	13	15	14	1.5	150	16	49	.1	8.6	276	250	.38
MAY												
11...	9.8	8.8	12	.7	120	12	14	.1	6.1	186	164	.25
JUL												
13...	12	11	13	.6	150	12	19	.1	6.7	230	194	.31
SEP												
09...	12	12	13	.9	150	13	34	.2	7.5	237	221	.32

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV												
25...	1440	.34	.060	.08	.30	.030	.09	.020	<.010	3	19	100
JAN												
13...	--	.36	.060	.08	.20	--	.06	.050	<.010	--	--	--
MAR												
03...	961	.34	.090	.12	.12	<.010	--	<.010	<.010	--	--	--
MAY												
11...	1130	.14	.020	.03	.49	.040	.12	.010	<.010	10	61	100
JUL												
13...	1310	<.10	.030	.04	.80	.020	.06	.010	<.010	--	--	--
SEP												
09...	825	<.10	.030	.04	.20	.060	.06	.040	<.010	4	14	100

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
NOV 25...	1145	2	2	<100	18	--	2	20	10	<1
MAR 03...	1330	2	2	<100	24	<1	<1	10	<10	<1
MAY 11...	1300	1	<1	<100	21	2	<1	20	10	2
SEP 09...	1000	2	2	<100	28	1	<1	20	10	3

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
NOV 25...	<1	68	3	190	21	12	<1	20	4	<.1
MAR 03...	<1	7	2	300	82	5	1	30	19	<.1
MAY 11...	1	40	13	320	29	25	4	20	4	<.1
SEP 09...	1	24	11	230	16	11	3	20	2	<.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
NOV 25...	<.1	5	1	<1	<1	<1	<1	70	<4
MAR 03...	<.1	<1	<1	<1	<1	<1	<1	40	28
MAY 11...	<.1	12	4	<1	<1	<1	<1	80	<3
SEP 09...	<.1	6	1	<1	<1	<1	<1	30	17

04126500 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	PCB, TOTAL (UG/L)	PCB, TOTAL IN BOTTOM MATERIAL (UG/KG)	ALDRIN, TOTAL (UG/L)	ALDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	CHLORDANE, TOTAL (UG/L)	CHLORDANE, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDD, TOTAL (UG/L)	DDD, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDE, TOTAL (UG/L)	DDE, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDT, TOTAL (UG/L)
NOV												
25...	1145	--	39	--	<.1	--	18	--	.8	--	<.1	--
MAR												
03...	1330	<.10	--	<.01	--	<.10	--	<.01	--	<.01	--	<.01
MAY												
11...	1300	<.10	63	<.01	<.1	<.10	5.0	<.01	<.1	<.01	<.1	<.01

DATE	DDT, TOTAL IN BOTTOM MATERIAL (UG/KG)	DIAZINON, TOTAL (UG/L)	DIELDRIN TOTAL (UG/L)	DIELDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ENDOSULFAN, TOTAL (UG/L)	ENDOSULFAN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ENDRIN, TOTAL (UG/L)	ENDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ETHION, TOTAL (UG/L)	HEPTACHLOR, TOTAL (UG/L)	HEPTACHLOR, TOTAL IN BOTTOM MATERIAL (UG/KG)	HEPTACHLOR EPOXIDE TOTAL (UG/L)
NOV												
25...	<.1	--	--	.1	--	<.1	--	<.1	--	--	<.1	--
MAR												
03...	--	<.01	<.01	--	<.01	--	<.01	--	<.01	<.01	--	<.01
MAY												
11...	<.1	<.01	<.01	.8	<.01	<.1	<.01	<.1	<.01	<.01	<.1	<.01

DATE	HEPTACHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG)	LINDANE TOTAL (UG/L)	LINDANE TOTAL IN BOTTOM MATERIAL (UG/KG)	MALATHION, TOTAL (UG/L)	METHOXYCHLOR, TOTAL (UG/L)	METHOXYCHLOR, TOT. IN BOTTOM MATL. (UG/KG)	METHYL PARATHION, TOTAL (UG/L)	METHYL TRITHION, TOTAL (UG/L)	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L)	PCN, TOTAL IN BOTTOM MATERIAL (UG/KG)	MIREX, TOTAL (UG/L)
NOV											
25...	<.1	--	<.1	--	--	<.1	--	--	--	<1.0	--
MAR											
03...	--	<.01	--	<.01	<.01	--	<.01	<.01	<.10	--	<.01
MAY											
11...	<.1	<.01	<.1	<.01	<.01	<.1	<.01	<.01	<.10	<1.0	<.01

DATE	MIREX, TOTAL IN BOTTOM MATERIAL (UG/KG)	PARATHION, TOTAL (UG/L)	PERTHANE IN BOTTOM MATERIL (UG/KG)	PERTHANE TOTAL (UG/L)	TOXAPHENE, TOTAL (UG/L)	TOXAPHENE, TOTAL IN BOTTOM MATERIAL (UG/KG)	TOTAL TRITHION (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
NOV											
25...	<.1	--	<.10	--	--	<1.0	--	--	--	--	--
MAR											
03...	--	<.01	--	<.01	<0	--	<.01	<.01	<.01	<.01	<.01
MAY											
11...	<.1	<.01	<1.00	<.10	<1	<10	<.01	<.01	<.01	<.01	<.01

04127000 BOARDMAN RIVER NEAR MAYFIELD, MI

LOCATION.--Lat 44°38'18", long 85°31'10", in SE¼ NE¼ sec.21, T.26 N., R.10 W., Grand Traverse County, Hydrologic Unit 04060105, on right bank 25 ft (8 m) downstream from Brown's Bridge, 300 ft (91 m) downstream from East Creek, 0.9 mi (1.4 km) downstream from Brown's Bridge Dam, 1.0 mi (1.6 km) northeast of Mayfield, and 9.6 mi (15.4 km) southeast of Traverse City.

DRAINAGE AREA.--186 mi² (482 km²).

PERIOD OF RECORD.--June 1952 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 760 ft (230 m), by barometer.

REMARKS.--Records good. Flow regulated by hydroelectric powerplant 0.9 mi (1.4 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--30 years, 191 ft³/s (5.409 m³/s), 13.95 in/yr (354 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,220 ft³/s (34.6 m³/s) Sept. 14, 1961, gage height, 6.90 ft (2.103 m); minimum, 30 ft³/s (0.85 m³/s) Jan. 15, 1965, gage height, 2.53 ft (0.771 m); minimum daily, 47 ft³/s (1.33 m³/s) Nov. 2, 3, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 566 ft³/s (16.0 m³/s) Apr. 20, gage height, 5.12 ft (1.561 m); minimum, 58 ft³/s (1.64 m³/s) Jan. 27, gage height, 2.71 ft (0.826 m); minimum daily, 110 ft³/s (3.12 m³/s) Oct. 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	120	146	182	133	137	136	258	211	180	148	142	137
2	126	126	185	131	138	134	238	208	164	141	143	141
3	125	117	177	137	132	132	286	221	162	138	147	142
4	123	126	170	134	128	136	275	211	160	138	154	141
5	118	131	166	139	135	134	269	193	160	137	153	141
6	164	142	164	141	138	132	264	194	159	129	143	167
7	158	147	157	139	138	134	231	201	148	121	133	161
8	141	148	140	139	129	130	183	206	141	121	133	146
9	130	140	166	138	124	131	201	204	141	121	137	138
10	126	138	164	137	123	130	204	196	146	126	139	137
11	125	137	158	141	127	138	199	190	147	157	138	136
12	117	134	157	138	129	139	218	185	149	161	138	136
13	115	133	156	135	129	157	246	182	148	157	141	134
14	110	133	150	132	130	170	249	163	140	145	144	137
15	126	133	144	133	130	196	259	150	142	147	144	138
16	130	136	143	132	131	224	333	153	155	145	144	138
17	126	138	139	133	134	241	486	177	160	195	137	138
18	171	138	142	132	135	182	431	183	163	339	132	139
19	247	139	142	130	141	145	450	158	163	223	132	136
20	174	148	148	130	144	138	487	146	159	189	133	147
21	177	153	154	132	143	139	329	169	177	178	134	154
22	149	152	150	137	135	151	333	180	181	173	133	154
23	148	145	142	138	130	164	400	184	160	146	134	154
24	158	135	139	137	132	195	283	167	146	131	134	164
25	158	133	131	138	132	192	268	148	144	131	137	168
26	153	142	133	137	136	182	272	152	141	131	135	168
27	139	178	133	133	136	177	264	171	143	155	134	144
28	141	191	142	137	136	174	256	183	142	162	134	130
29	146	197	145	138	---	174	249	182	140	143	135	130
30	148	175	136	140	---	213	224	180	145	143	137	128
31	147	---	132	139	---	277	---	178	---	142	136	---
TOTAL	4436	4331	4687	4210	3732	5097	8645	5626	4605	4813	4290	4324
MEAN	143	144	151	136	133	164	288	181	154	155	138	144
MAX	247	197	185	141	144	277	487	221	181	339	154	168
MIN	110	117	131	130	123	130	183	146	140	121	132	128
CFSM	.77	.77	.81	.73	.72	.88	1.55	.97	.83	.83	.74	.77
IN.	.89	.87	.94	.84	.75	1.02	1.73	1.13	.92	.96	.86	.86

CAL YR 1981 TOTAL 58004 MEAN 159 MAX 321 MIN 107 CFSM .86 IN 11.60
WTR YR 1982 TOTAL 58796 MEAN 161 MAX 487 MIN 110 CFSM .87 IN 11.76

04127800 JORDAN RIVER NEAR EAST JORDAN, MI

LOCATION.--Lat 45°06'09", long 85°05'53", in NW¼ NW¼ sec.7, T.31 N., R.6 W., Antrim County, Hydrologic Unit 04060105, on right bank 600 ft (183 m) downstream from Webster Bridge, 4.2 mi (6.8 km) south of East Jordan and 4.5 mi (7.2 km) upstream from mouth.

DRAINAGE AREA.--67.6 mi² (175.1 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1960-65. October 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 610 ft (186 m), from topographic map. Nov. 19, 1959, to Sept. 30, 1966, nonrecording gage at present site and at site 600 ft (183 m) upstream at same datum.

REMARKS.--Water-discharge records good except those for the winter period and those for period of no gage-height record, Jan. 11 to Feb. 10, which are fair. Some regulation during low flows by fish hatchery above station.

AVERAGE DISCHARGE.--16 years, 187 ft³/s (5.296 m³/s), 37.57 in/yr (954 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,360 ft³/s (38.5 m³/s) July 19, 1975, gage height, 6.51 ft (1.984 m): minimum, 91 ft³/s (2.58 m³/s) Mar. 8, 1982, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 400 ft³/s (11.3 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 31	2100	402	11.4	4.58	1.396	Apr. 20	0600	418	11.8	4.65	1.417
Apr. 17	0200	*518	14.7	*4.97	1.515						

Minimum discharge, 91 ft³/s (2.58 m³/s) Mar. 8, gage height, 2.56 ft (0.780 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	185	159	166	158	155	160	285	174	248	145	156	186
2	185	158	180	158	155	158	217	171	174	146	159	199
3	166	158	188	158	155	160	328	170	159	147	178	186
4	163	158	176	155	155	160	237	169	155	152	200	160
5	165	159	168	155	155	160	206	169	154	146	166	190
6	291	173	165	158	152	160	192	170	153	144	159	244
7	193	164	168	158	152	158	182	168	152	142	156	173
8	167	160	177	160	150	157	183	165	152	141	154	158
9	162	158	166	160	150	160	190	164	150	141	157	155
10	159	157	162	160	150	157	192	170	155	144	157	152
11	158	158	161	160	152	158	187	166	152	177	155	151
12	157	157	162	160	155	158	185	164	149	162	151	150
13	157	157	162	158	155	212	254	163	160	147	150	152
14	159	158	163	155	155	180	237	162	151	148	150	177
15	171	157	164	155	160	172	255	162	174	149	151	193
16	163	157	162	155	161	178	335	165	173	146	149	173
17	163	157	159	155	161	182	401	169	167	173	159	167
18	237	158	160	155	162	175	264	162	173	203	149	206
19	223	158	160	155	163	172	252	161	164	168	158	169
20	175	161	158	155	163	171	344	160	159	153	182	264
21	165	159	158	158	165	173	232	159	158	151	154	221
22	162	158	161	158	164	172	209	156	155	151	193	183
23	167	158	160	158	164	179	210	159	152	150	190	168
24	166	154	157	158	162	226	208	160	149	150	160	165
25	164	156	157	158	160	225	197	156	158	156	167	214
26	163	180	157	158	160	192	190	154	153	156	156	186
27	161	241	159	158	160	177	191	154	149	172	154	170
28	159	178	158	158	157	172	180	164	149	168	149	166
29	159	167	157	160	---	183	177	172	150	157	153	162
30	159	163	157	160	---	243	174	159	147	163	162	159
31	159	---	158	160	---	368	---	161	---	160	155	---
TOTAL	5383	4896	5066	4887	4408	5658	6894	5078	4794	4808	4989	5399
MEAN	174	163	163	158	157	183	230	164	160	155	161	180
MAX	291	241	188	160	165	368	401	174	248	203	200	264
MIN	157	154	157	155	150	157	174	154	147	141	149	150
CFSM	2.57	2.41	2.41	2.34	2.32	2.71	3.40	2.43	2.37	2.29	2.38	2.66
IN.	2.96	2.69	2.79	2.69	2.43	3.11	3.79	2.79	2.64	2.65	2.75	2.97

CAL YR 1981 TOTAL 62722 MEAN 172 MAX 522 MIN 140 CFSM 2.54 IN 34.52
WTR YR 1982 TOTAL 62260 MEAN 171 MAX 401 MIN 141 CFSM 2.53 IN 34.26

04127800 JORDAN RIVER NEAR EAST JORDAN, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1966 to current year.

INSTRUMENTATION.--Temperature recorder since October 1966.

REMARKS.--Temperature recorder clock stopped Mar. 13 to Apr. 1 (range in temperature 1.0 to 4.0°C).

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 20.0°C July 11, 1976; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 18.5°C July 7, 8; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	8.5	8.0	8.0	8.0	3.0	2.5	.0	.0	.0	.0	1.0	1.0
2	8.0	7.5	8.0	7.0	3.0	3.0	.0	.0	.0	.0	1.0	.5
3	7.5	6.5	7.0	5.5	3.0	3.0	.0	.0	.0	.0	.5	.5
4	6.5	6.5	6.0	5.5	3.0	3.0	.0	.0	.0	.0	.5	.5
5	8.0	6.5	7.5	6.0	3.0	3.0	.0	.0	.0	.0	.5	.5
6	8.0	8.0	7.5	6.0	3.0	3.0	.0	.0	.0	.0	.5	.5
7	8.0	8.0	6.0	5.5	3.0	3.0	.0	.0	.0	.0	1.0	.5
8	8.0	6.0	5.5	5.5	3.0	2.5	.0	.0	.0	.0	1.0	1.0
9	6.5	6.0	5.5	5.0	2.5	2.0	.0	.0	.0	.0	1.0	1.0
10	7.0	6.5	5.0	4.5	2.0	1.5	.0	.0	.0	.0	1.5	1.0
11	7.0	7.0	4.5	4.5	1.5	1.5	.0	.0	.0	.0	2.5	1.5
12	7.0	6.0	5.0	4.5	2.0	1.5	.0	.0	.0	.0	2.5	2.0
13	7.0	6.5	5.0	5.0	2.0	1.5	.0	.0	.0	.0	---	---
14	7.5	7.0	5.0	5.0	1.5	1.5	.0	.0	.0	.0	---	---
15	7.5	7.5	5.0	5.0	1.5	1.5	.0	.0	1.0	.0	---	---
16	7.5	6.5	5.0	5.0	1.5	1.0	.0	.0	1.0	1.0	---	---
17	6.5	6.0	5.0	5.0	1.0	.5	.0	.0	1.0	1.0	---	---
18	7.0	6.5	5.0	5.0	.5	.5	.0	.0	1.0	1.0	---	---
19	6.5	5.5	5.0	5.0	.5	.5	.0	.0	1.5	1.0	---	---
20	5.5	5.5	5.0	4.5	.5	.5	.0	.0	2.0	1.5	---	---
21	5.5	5.5	4.5	4.5	.5	.5	.0	.0	2.0	2.0	---	---
22	5.5	5.5	4.5	4.0	1.5	.5	.0	.0	2.5	2.0	---	---
23	5.5	5.0	4.0	4.0	1.5	1.5	.0	.0	2.5	2.5	---	---
24	5.0	4.0	4.0	2.5	1.5	.5	.0	.0	2.5	1.5	---	---
25	4.0	4.0	2.5	2.5	.5	.5	.0	.0	1.5	.5	---	---
26	5.0	4.0	2.5	2.5	.5	.5	.0	.0	.5	.5	---	---
27	5.0	5.0	2.5	2.5	1.0	.5	.0	.0	1.0	.5	---	---
28	5.5	5.0	2.5	2.5	1.0	.5	.0	.0	1.0	1.0	---	---
29	5.5	5.5	2.5	2.5	.5	.5	.0	.0	---	---	---	---
30	6.5	5.5	2.5	2.5	.5	.0	.0	.0	---	---	---	---
31	8.0	6.5	---	---	.0	.0	.0	.0	---	---	---	---
MONTH	8.5	4.0	8.0	2.5	3.0	.0	.0	.0	2.5	.0		

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	APRIL MAX	APRIL MIN	MAY MAX	MAY MIN	JUNE MAX	JUNE MIN	JULY MAX	JULY MIN	AUGUST MAX	AUGUST MIN	SEPTEMBER MAX	SEPTEMBER MIN
1	---	---	11.5	9.5	13.5	12.0	14.0	12.0	16.0	15.0	12.0	11.5
2	3.0	3.0	11.5	10.0	13.0	11.5	14.5	12.5	15.5	15.5	12.0	12.0
3	3.0	2.5	11.0	10.0	12.5	10.0	14.5	13.0	15.5	15.0	12.0	12.0
4	2.5	1.0	11.5	10.0	11.5	9.5	14.5	13.0	15.5	15.0	12.0	11.0
5	1.0	1.0	11.5	11.5	12.0	10.0	16.0	13.5	17.0	15.0	12.0	12.0
6	1.5	1.0	12.5	11.5	13.0	10.5	18.0	16.0	17.0	16.0	12.5	12.0
7	2.0	1.0	12.5	12.0	13.0	13.0	18.5	17.5	17.5	15.5	12.5	11.5
8	3.0	1.5	12.0	10.0	15.0	12.5	18.5	16.0	17.5	16.5	12.0	11.0
9	4.0	2.5	12.0	9.5	15.0	13.0	17.5	15.0	17.5	15.0	13.5	12.0
10	4.0	3.5	12.5	10.0	13.5	13.0	17.0	15.5	15.0	13.5	13.5	13.0
11	3.5	3.5	14.0	12.0	13.0	10.5	17.0	15.0	14.0	12.5	15.5	13.5
12	3.5	3.5	14.5	13.5	13.0	11.5	15.5	14.0	14.0	12.5	16.0	15.5
13	3.5	3.5	14.5	14.0	13.5	12.0	16.5	14.5	14.0	12.5	16.0	16.0
14	5.0	3.0	14.0	13.0	13.5	11.5	16.5	15.5	14.0	13.0	16.0	14.5
15	5.5	4.5	13.0	13.0	12.5	11.5	17.0	15.5	15.5	14.0	14.5	13.0
16	5.5	5.0	13.0	12.5	11.5	10.5	18.0	16.5	16.5	14.5	13.0	12.0
17	5.0	4.0	13.0	12.5	11.0	10.5	18.0	17.0	16.5	15.0	12.0	11.0
18	5.0	3.5	16.0	13.0	10.5	10.5	17.0	17.0	16.5	14.0	11.0	11.0
19	5.5	5.0	16.0	14.0	12.0	10.5	17.5	16.0	15.5	15.0	12.0	11.0
20	5.0	4.0	15.5	12.5	12.0	11.0	17.5	15.0	16.0	15.5	12.0	12.0
21	5.0	3.0	12.5	10.5	11.5	11.0	17.0	15.0	16.0	14.5	12.0	11.5
22	6.0	4.0	12.5	11.0	11.5	11.0	17.0	16.0	15.0	14.5	11.5	11.5
23	7.5	6.0	11.0	10.5	12.5	10.5	17.5	16.0	14.5	13.5	11.5	11.0
24	9.5	7.5	13.5	10.5	12.5	11.0	17.5	16.0	14.0	13.5	11.5	11.5
25	10.0	9.5	14.0	12.0	12.0	11.5	18.0	16.5	14.5	13.5	11.5	11.5
26	10.0	7.5	14.0	12.5	12.5	10.0	18.0	16.5	14.5	13.5	12.0	11.5
27	8.0	6.0	14.0	13.0	13.0	11.5	16.5	15.0	14.0	13.5	12.0	12.0
28	8.5	7.0	14.0	13.5	15.5	12.5	16.5	14.0	13.5	12.0	12.5	12.0
29	9.5	7.5	13.5	12.5	15.5	14.0	16.5	14.5	12.0	10.5	13.5	12.5
30	9.5	8.5	14.0	12.5	14.5	12.0	16.0	15.5	11.5	10.5	14.5	13.5
31	---	---	14.0	13.0	---	---	16.0	15.5	11.5	11.5	---	---
MONTH	10.0	1.0	16.0	9.5	15.5	9.5	18.5	12.0	17.5	10.5	16.0	11.0

04127918 PINE RIVER NEAR RUDYARD, MI

LOCATION.--Lat 46°11'09", long 84°35'52", in NW¼ NE¼ sec.30, T.44 N., R.2 W., Chippewa County, Hydrologic Unit 04070002, on right bank 15 ft (5 m) upstream from county highway bridge, 3.2 mi (5.1 km) south of Rudyard.

DRAINAGE AREA.--184 mi² (477 km²).

PERIOD OF RECORD.--April 1972 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 600 ft (183 m) from topographic map (nearest 10 ft). Prior to Aug. 4, 1972, non-recording gage at same site and datum.

REMARKS.--Records good except those for the winter period, those for period of no gage-height record, Jan. 31 to Mar. 9, and those for period of fragmentary gage-height record, Mar. 12 to Apr. 20, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--10 years, 233 ft³/s (6.599 m³/s), 17.20 in/yr (437 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,190 ft³/s (119 m³/s) June 18, 1975, gage height, 17.62 ft (5.371 m); minimum, 53 ft³/s (1.50 m³/s) July 29, 30, 1982, gage height, 1.83 ft (0.558 m).

EXTREMES OUTSIDE PERIOD OF RECORD.--A discharge of 50.3 ft³/s (1.42 m³/s) was measured Aug. 6, 1963.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft³/s (34.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Apr. 17	--	ice jam		*a12.90	3.932	Apr. 24	2300	*2460	69.7	11.87	3.618

a From floodmark

Minimum discharge, 53 ft³/s (1.50 m³/s) July 29, 30, gage height, 1.83 ft (0.558 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	73	151	125	82	90	88	310	615	93	66	62	84
2	111	140	135	82	90	86	370	509	100	68	58	203
3	123	129	145	84	90	86	450	425	89	72	96	267
4	109	122	150	84	90	84	540	355	83	68	239	216
5	98	117	150	84	90	84	530	310	82	68	198	243
6	109	131	150	84	90	84	520	295	79	67	160	610
7	187	148	145	84	90	84	500	277	76	71	127	396
8	173	140	140	84	90	84	480	251	75	68	102	272
9	147	132	130	84	90	84	480	221	74	65	94	219
10	126	124	125	84	90	84	490	224	76	62	88	187
11	113	124	120	84	90	88	510	268	88	64	79	162
12	103	122	115	86	90	90	540	250	81	98	73	137
13	97	117	110	86	90	96	600	229	73	100	68	118
14	94	116	105	86	90	105	700	235	72	84	63	139
15	98	111	105	86	90	115	800	216	91	81	62	203
16	113	109	100	86	90	125	1000	210	102	85	62	212
17	113	104	95	86	90	125	1050	195	90	100	61	195
18	180	103	92	86	90	130	1050	187	89	103	59	249
19	286	104	88	86	90	130	1000	180	85	90	57	226
20	256	104	86	88	90	130	960	164	80	75	57	293
21	235	99	84	88	90	135	980	153	81	67	57	265
22	209	90	84	88	92	140	1060	141	90	63	68	230
23	233	88	82	88	92	145	1660	129	87	65	110	196
24	223	85	80	88	92	150	2150	119	81	60	103	180
25	199	82	80	90	92	160	2270	115	84	57	90	291
26	196	80	80	90	90	170	2140	114	85	60	82	287
27	195	90	80	90	90	180	1660	107	78	56	85	248
28	186	100	80	90	90	190	1170	99	73	57	86	215
29	173	115	82	90	---	200	900	97	72	54	77	191
30	162	120	82	90	---	220	728	94	68	57	75	172
31	157	---	82	90	---	260	---	90	---	64	79	---
TOTAL	4877	3397	3307	2678	2528	3932	27598	6874	2477	2215	2777	6906
MEAN	157	113	107	86.4	90.3	127	920	222	82.6	71.5	89.6	230
MAX	286	151	150	90	92	260	2270	615	102	103	239	610
MIN	73	80	80	82	90	84	310	90	68	54	57	84
CFSM	.85	.61	.58	.47	.49	.69	5.00	1.21	.45	.39	.49	1.25
IN.	.99	.69	.67	.54	.51	.79	5.58	1.39	.50	.45	.56	1.40

CAL YR 1981 TOTAL 62881 MEAN 172 MAX 2190 MIN 57 CFSM .94 IN 12.71
WTR YR 1982 TOTAL 69566 MEAN 191 MAX 2270 MIN 54 CFSM 1.04 IN 14.06

04128000 STURGEON RIVER NEAR WOLVERINE, MI

LOCATION.--Lat 45°17'56", long 84°36'40", in SE¼ NE¼ sec.36, T.34 N., R.3 W., Cheboygan County, Hydrologic Unit 04070004, on left bank 1.8 mi (2.9 km) north of Wolverine, 2.8 mi (4.5 km) downstream from West Branch, and 9 mi (14 km) upstream from mouth.

DRAINAGE AREA.--170 mi² (440 km²), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April 1942 to current year.

REVISED RECORDS.--WSP 1307: 1944(M), 1948(M), WSP 1727: 1951(M).

GAGE.--Water-stage recorder. Altitude of gage is 740 ft (226 m), from topographic map. Prior to June 15, 1942, nonrecording gage at site 1.0 mi (1.6 km) upstream, and June 16, 1942, to Sept. 30, 1958, at site 0.7 mi (1.1 km) upstream at different datums.

REMARKS.--Water-discharge records good except those for the winter period and those for the period of no gage-height record, Feb. 2 to Mar. 31, which are poor. Prior to July 1975 intermittent regulation at low flows by ponds 2.4 mi (3.9 km) above station.

AVERAGE DISCHARGE.--40 years, 218 ft³/s (6.174 m³/s), 17.41 in/yr (442 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,290 ft³/s (36.5 m³/s) Sept. 29, 1972, gage height, 3.72 ft (1.134 m); maximum gage height, 4.48 ft (1.366 m) Sept. 14, 1961: minimum discharge, 94 ft³/s (2.66 m³/s) Jan. 19, 1971, result of freezeup; minimum daily, 113 ft³/s (3.20 m³/s) Aug. 6, 1958.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 610 ft³/s (17.3 m³/s) Apr. 17, gage height, 2.78 ft (0.847 m): minimum, 135 ft³/s (3.82 m³/s) Jan. 10, gage height, 1.49 ft (0.454 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	201	171	195	175	172	178	368	264	367	162	166	182
2	284	169	207	175	172	178	312	248	299	160	170	222
3	208	168	212	175	170	178	360	233	216	162	209	231
4	186	166	210	175	170	178	352	224	196	186	250	187
5	183	167	202	175	170	178	308	227	186	173	198	179
6	276	175	197	175	170	178	272	227	184	169	181	271
7	320	177	197	175	170	178	254	223	181	165	170	226
8	221	171	206	170	170	178	258	217	192	158	166	200
9	190	168	201	165	170	178	258	212	176	156	171	191
10	186	165	196	147	170	178	258	223	173	147	173	185
11	181	165	194	150	170	180	244	229	174	224	161	180
12	176	164	185	155	170	180	248	217	170	221	158	178
13	171	165	183	160	170	200	304	221	180	191	156	179
14	171	165	184	165	170	230	332	229	173	237	156	272
15	183	165	186	170	175	220	356	215	174	312	158	299
16	181	164	186	170	175	215	448	211	205	227	157	243
17	176	163	179	170	175	205	595	210	191	224	155	223
18	225	167	181	170	175	200	520	209	205	258	148	251
19	274	167	180	170	180	195	430	204	205	234	149	222
20	216	169	180	173	180	195	485	203	199	202	153	324
21	194	169	180	174	180	195	434	196	208	186	165	289
22	187	168	180	176	180	198	370	190	189	178	182	252
23	186	167	181	176	180	200	386	191	186	178	208	229
24	187	163	180	176	180	230	439	201	176	169	175	214
25	183	166	177	176	180	252	430	192	181	169	176	302
26	183	178	177	175	180	240	383	183	178	167	172	266
27	179	268	177	175	178	220	351	181	171	171	168	230
28	176	230	179	175	178	200	309	189	169	173	159	216
29	174	205	178	175	---	210	285	194	169	163	159	209
30	172	199	176	175	---	250	269	195	167	182	170	199
31	171	---	175	173	---	370	---	190	---	174	166	---
TOTAL	6210	5264	5821	5286	4880	6365	10618	6548	5840	5898	5305	6851
MEAN	200	175	188	171	174	205	354	211	195	190	171	228
MAX	320	268	212	176	180	370	595	264	367	312	250	324
MIN	171	163	175	147	170	178	244	181	167	156	148	178
CFSM	1.18	1.03	1.11	1.01	1.02	1.21	2.08	1.24	1.15	1.12	1.01	1.34
IN.	1.36	1.15	1.27	1.16	1.07	1.39	2.32	1.43	1.28	1.29	1.16	1.50

CAL YR 1981 TOTAL 69439 MEAN 190 MAX 436 MIN 120 CFSM 1.12 IN 15.19
WTR YR 1982 TOTAL 74886 MEAN 205 MAX 595 MIN 147 CFSM 1.21 IN 16.39

04128000 STURGEON RIVER NEAR WOLVERINE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1958 to current year.

INSTRUMENTATION.--Temperature recorder since October 1958.

REMARKS.--Temperature recorder clock stopped Dec. 28 to Jan. 6 (range in temperature 0.0 to 0.5°C), Mar. 9-30 (range in temperature 0.0 to 4.5°C). No record May 4-6.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 24.0°C June 30, 1964; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 20.5°C July 6, 7; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	9.5	9.5	9.0	8.5	3.0	3.0	---	---	.0	.0	.0	.0
2	9.5	9.0	9.0	7.0	3.0	3.0	---	---	.0	.0	.5	.0
3	9.0	8.0	7.5	6.0	3.0	3.0	---	---	.0	.0	.5	.0
4	8.0	8.0	6.5	6.0	3.0	3.0	---	---	.0	.0	.0	.0
5	8.5	8.0	8.0	6.5	3.0	3.0	---	---	.0	.0	.0	.0
6	9.0	8.5	8.0	7.0	3.0	3.0	---	---	.0	.0	.0	.0
7	9.0	9.0	7.0	6.0	3.0	3.0	.0	.0	.0	.0	.0	.0
8	9.0	7.5	6.0	6.0	3.0	3.0	.0	.0	.0	.0	.5	.0
9	8.5	7.5	6.0	5.5	3.0	3.0	.0	.0	.0	.0	---	---
10	8.5	8.0	5.5	5.5	3.0	2.5	.0	.0	.0	.0	---	---
11	9.0	8.0	5.5	5.5	2.5	2.5	.0	.0	.0	.0	---	---
12	9.0	7.5	5.5	4.5	2.5	2.5	.0	.0	.0	.0	---	---
13	8.5	7.5	4.5	4.5	2.5	2.5	.0	.0	.0	.0	---	---
14	9.0	8.5	4.5	4.5	2.5	2.5	.0	.0	.0	.0	---	---
15	9.0	9.0	4.5	4.5	2.5	2.5	.0	.0	.0	.0	---	---
16	9.0	8.0	4.5	4.0	2.5	2.0	.0	.0	.0	.0	---	---
17	8.5	8.0	4.0	4.0	2.0	1.5	.0	.0	.0	.0	---	---
18	8.5	8.5	4.0	4.0	1.5	1.5	.0	.0	.0	.0	---	---
19	8.5	7.5	4.0	4.0	1.5	1.5	.0	.0	.0	.0	---	---
20	7.5	7.5	4.0	4.0	1.5	1.0	.0	.0	.0	.0	---	---
21	7.5	7.5	4.0	4.0	1.0	1.0	.0	.0	.0	.0	---	---
22	7.5	7.5	4.0	4.0	1.0	1.0	.0	.0	.0	.0	---	---
23	7.5	6.5	4.0	4.0	1.0	1.0	.0	.0	1.5	.0	---	---
24	6.5	6.0	4.0	3.5	1.0	.5	.0	.0	1.5	1.0	---	---
25	6.0	6.0	3.5	3.5	.5	.5	.0	.0	1.0	.0	---	---
26	6.0	6.0	3.5	3.5	.5	.5	.0	.0	.0	.0	---	---
27	6.5	6.0	3.5	3.5	.5	.5	.0	.0	.0	.0	---	---
28	6.5	6.5	3.5	3.5	---	---	.0	.0	.0	.0	---	---
29	6.5	6.0	3.5	3.0	---	---	.0	.0	---	---	---	---
30	7.5	6.5	3.0	3.0	---	---	.0	.0	---	---	---	---
31	8.5	7.5	---	---	---	---	.0	.0	---	---	3.5	3.5
MONTH	9.5	6.0	9.0	3.0					1.5	.0		

04128000 STURGEON RIVER NEAR WOLVERINE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	4.0	3.5	8.0	7.0	15.5	14.5	16.5	13.0	18.5	16.5	13.0	13.0
2	3.5	3.5	8.5	8.0	15.5	14.0	17.0	13.5	17.5	16.5	13.5	13.0
3	3.5	3.5	8.5	8.0	14.5	12.0	17.0	14.0	16.5	15.0	13.5	13.0
4	3.5	2.5	---	---	14.5	11.0	17.5	14.0	16.5	15.5	14.0	12.0
5	2.5	2.5	---	---	15.0	11.5	17.5	15.0	18.5	15.5	14.0	12.5
6	3.0	2.5	---	---	15.5	11.5	20.5	17.0	18.5	16.5	14.5	13.0
7	3.0	2.5	13.5	13.5	15.5	13.5	20.5	18.5	19.5	16.5	14.0	12.0
8	3.5	2.5	13.5	12.0	17.0	13.5	20.0	17.0	19.5	17.5	14.0	12.0
9	4.0	3.0	13.0	11.5	17.0	14.0	19.0	16.0	19.5	16.0	16.0	13.5
10	4.0	3.5	13.0	12.0	16.5	15.0	19.0	16.5	16.0	14.5	16.5	14.5
11	3.5	3.5	15.0	12.5	16.0	12.0	19.0	15.5	15.5	14.0	17.5	15.5
12	3.5	3.5	16.0	14.0	16.0	13.0	17.5	14.5	16.0	13.5	18.5	16.5
13	3.5	3.5	16.0	14.5	16.5	13.5	18.0	14.5	16.0	13.5	18.5	17.5
14	4.0	3.5	15.0	14.5	16.5	13.0	17.0	15.5	16.0	14.0	18.5	15.5
15	4.0	4.0	14.5	14.5	15.5	13.5	17.5	15.5	17.0	14.5	15.5	13.5
16	4.0	4.0	14.5	14.5	14.5	12.5	19.5	16.5	18.5	15.0	13.5	12.5
17	4.0	3.5	14.5	14.0	14.5	12.0	19.5	17.5	18.5	16.0	12.5	11.5
18	3.5	2.5	15.5	14.0	12.0	11.5	18.0	17.5	18.0	14.5	12.0	11.5
19	3.5	3.5	15.5	15.0	14.5	11.5	18.5	16.0	18.5	16.0	12.5	11.0
20	3.5	3.5	15.5	15.0	14.5	12.5	18.0	15.0	18.5	16.0	12.5	12.0
21	3.5	3.5	15.0	12.5	14.0	12.0	18.5	15.0	17.0	15.0	12.0	11.5
22	4.0	3.5	13.5	12.0	14.0	12.5	18.5	16.5	16.0	14.5	12.0	11.0
23	5.0	4.0	12.0	12.0	15.5	12.0	19.0	16.0	15.0	13.5	12.0	11.0
24	6.5	5.0	13.0	11.5	15.5	12.0	18.5	15.5	15.0	13.5	12.0	12.0
25	7.0	6.5	14.5	12.5	14.0	13.5	20.0	17.5	16.0	13.5	12.0	12.0
26	7.0	6.5	15.0	13.5	15.5	11.5	19.5	16.5	15.5	14.5	12.5	12.0
27	6.5	5.5	15.0	14.5	15.5	12.5	16.5	16.0	15.5	14.5	12.5	12.5
28	6.5	6.0	15.0	15.0	17.5	13.5	18.0	14.5	14.5	13.0	13.0	12.0
29	7.0	6.5	15.0	14.5	17.5	15.0	18.0	15.0	13.5	12.5	14.5	13.0
30	7.0	7.0	15.5	14.5	17.0	13.5	18.0	16.0	12.5	12.0	15.5	14.0
31	---	---	15.5	15.0	---	---	18.5	16.5	13.0	12.0	---	---
MONTH	7.0	2.5			17.5	11.0	20.5	13.0	19.5	12.0	18.5	11.0

04128500 INDIAN RIVER AT INDIAN RIVER, MI

LOCATION.--Lat 45°24'38", long 84°37'12", in NE¼ SW¼ sec.24, T.35 N., R.3 W., Cheboygan County, Hydrologic Unit 04070004, on left bank in Indian River, 500 ft (152 m) downstream from Burt Lake, and 2.3 mi (3.7 km) upstream from Mullett Lake.

DRAINAGE AREA.--583 mi² (1,510 km²).

PERIOD OF RECORD.--April 1942 to September 1982 (discontinued).

REVISED RECORDS.--WSP 1437: 1942(M), 1945(M), 1947.

GAGE.--Water-stage recorder. Datum of gage is 590.21 ft (179.896 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Nov. 12, 1942, nonrecording gage at site 100 ft (30 m) downstream. Auxiliary water-stage recorder 14.3 mi (23.0 km) downstream from base gage, near Cheboygan, datum of gage is 591.21 ft (180.201 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated by dam at Cheboygan. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--40 years, 568 ft³/s (16.09 m³/s), 13.23 in/yr (336 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 1,250 ft³/s (35.4 m³/s) May 3, 4, 1979; maximum daily gage height, 5.58 ft (1.701 m) May 13, 14, 1960; minimum daily discharge, 210 ft³/s (5.95 m³/s) Aug. 22, 1982; minimum daily gage height, 3.16 ft (0.963 m) Mar. 12, 1982.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 856 ft³/s (24.2 m³/s) Apr. 30; maximum daily gage height, 4.29 ft (1.308 m), Apr. 27, 28, 29; minimum daily discharge, 210 ft³/s (5.95 m³/s) Aug. 22; minimum daily gage height, 3.16 ft (0.963 m) Mar. 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	354	490	498	518	585	497	540	842	417	376	349	360
2	376	485	507	518	578	497	546	841	466	371	346	328
3	374	491	525	506	573	497	561	837	469	387	337	383
4	381	495	534	535	575	494	580	811	477	391	306	374
5	368	506	534	557	568	491	581	736	486	358	306	350
6	389	550	519	531	562	482	589	710	485	339	335	383
7	422	518	534	521	561	482	581	677	483	340	369	368
8	409	524	563	534	555	485	580	655	505	371	409	381
9	416	528	553	545	555	485	576	631	497	378	445	390
10	427	489	576	562	549	484	576	602	463	382	418	376
11	446	541	601	580	540	482	583	594	460	327	384	357
12	449	527	580	563	540	484	582	611	489	408	348	356
13	452	530	557	571	540	480	585	600	498	399	322	371
14	462	535	543	574	540	483	567	596	499	385	320	450
15	505	542	556	570	539	482	560	601	477	364	319	478
16	488	546	563	590	536	482	559	602	453	323	312	519
17	487	545	568	617	537	491	561	591	413	286	322	513
18	517	551	564	599	530	485	600	587	419	281	305	560
19	540	559	582	596	529	483	615	575	426	294	286	541
20	517	584	576	596	529	487	668	605	419	307	306	602
21	517	573	563	602	529	486	705	611	426	331	282	617
22	502	553	567	604	524	483	727	599	420	371	210	605
23	523	543	574	616	525	494	747	576	389	425	291	603
24	481	528	555	620	517	499	769	559	366	439	342	618
25	475	513	543	613	511	504	791	518	370	461	343	654
26	496	509	548	613	503	513	821	505	387	466	328	631
27	491	522	534	610	501	520	831	506	380	435	353	645
28	518	525	528	615	500	518	843	502	366	423	355	633
29	520	505	513	597	---	525	853	474	380	382	347	628
30	498	493	518	596	---	527	856	448	392	368	375	641
31	496	---	505	598	---	520	---	424	---	360	390	---
TOTAL	14296	15800	16981	17867	15131	15322	19533	19026	13177	11528	10460	14715
MEAN	461	527	548	576	540	494	651	614	439	372	337	491
MAX	540	584	601	620	585	527	856	842	505	466	445	654
MIN	354	485	498	506	500	480	540	424	366	281	210	328
CFSM	.79	.90	.94	.99	.93	.85	1.12	1.05	.75	.64	.58	.84
IN.	.91	1.01	1.08	1.14	.97	.98	1.25	1.21	.84	.74	.67	.94

CAL YR 1981 TOTAL 179516 MEAN 492 MAX 671 MIN 237 CFSM .84 IN 11.45
WTR YR 1982 TOTAL 183836 MEAN 504 MAX 856 MIN 210 CFSM .86 IN 11.73

04129000 PIGEON RIVER NEAR VANDERBILT, MI

LOCATION.--Lat 45°10'15", long 84°26'18", in SE¼ SW¼ sec.9, T.32 N., R.1 W., Otsego County, Hydrologic Unit 04070004, on right bank at Pigeon River Headquarters, 11.1 mi (17.9 km) east of Vanderbilt, and 26 mi (41.8 km) upstream from Mullett Lake.

DRAINAGE AREA.--63 mi² (160 km²), approximately.

PERIOD OF RECORD.--September 1950 to current year.

GAGE.--Water stage recorder. Datum of gage is 886.24 ft (270.126 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Prior to May 16, 1957, and since Apr. 22, 1958, occasional regulation by Lansing Club Dam, 3.5 mi (5.6 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--32 years, 77.6 ft³/s (2.198 m³/s), 16.73 in/yr (425 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,500 ft³/s (42.5 m³/s) May 15, 1957, gage height, 6.80 ft (2.073 m), from floodmark, from rating curve extended above 500 ft³/s (14.2 m³/s), result of failure of Lansing Club Dam; minimum, 13 ft³/s (0.37 m³/s) Jan. 8, 1957.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 425 ft³/s (12.0 m³/s) Apr. 17, gage height, 4.99 ft (1.521 m); minimum, 31 ft³/s (0.88 m³/s) Mar. 3, gage height, 1.79 ft (0.546 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	69	64	72	60	61	61	143	83	95	53	52	55
2	121	59	58	61	60	61	107	78	79	52	81	60
3	83	63	79	62	60	61	127	74	73	52	73	69
4	76	61	76	62	60	61	137	71	60	48	105	62
5	66	61	65	62	60	61	120	72	61	56	81	64
6	159	67	66	61	60	61	102	74	56	55	68	88
7	179	66	71	61	60	61	91	75	57	54	58	74
8	108	64	65	62	61	61	79	71	55	50	56	59
9	72	65	69	62	61	61	93	63	55	50	56	58
10	75	60	70	63	60	60	79	73	56	51	56	55
11	72	66	65	63	58	60	80	74	57	48	54	56
12	68	60	59	62	58	61	79	81	55	53	52	58
13	64	56	58	61	59	84	100	58	54	56	51	54
14	66	58	61	61	60	78	119	66	54	57	51	79
15	71	58	62	61	62	75	128	78	56	58	51	88
16	76	60	61	60	62	73	188	53	76	58	51	70
17	73	60	61	60	62	67	316	73	62	60	50	69
18	80	62	60	60	62	71	211	69	74	63	48	81
19	113	62	60	60	62	66	161	93	62	72	49	67
20	99	63	59	60	62	69	186	77	71	56	51	121
21	70	62	57	60	63	67	161	69	61	54	53	97
22	73	61	55	61	64	67	126	60	69	57	58	81
23	75	65	53	62	63	68	136	72	54	54	62	68
24	77	63	57	63	62	78	174	62	54	51	58	75
25	71	61	61	63	62	96	172	68	65	48	56	93
26	64	67	62	62	62	80	155	62	54	48	54	97
27	66	106	61	61	62	73	127	62	54	48	57	74
28	67	105	61	62	62	68	98	77	56	49	58	71
29	66	81	61	64	---	73	94	58	52	52	61	64
30	64	80	61	63	---	86	90	59	53	53	54	75
31	68	---	61	62	---	127	---	62	---	53	54	---
TOTAL	2551	1986	1947	1907	1710	2196	3969	2167	1940	1669	1819	2182
MEAN	82.3	66.2	62.8	61.5	61.1	70.8	132	69.9	61.3	53.8	58.7	72.7
MAX	179	106	79	64	64	127	316	93	95	72	105	121
MIN	64	56	53	60	58	60	79	53	52	48	48	54
CFSM	1.31	1.05	1.00	.98	.97	1.12	2.10	1.11	.97	.85	.93	1.15
IN.	1.51	1.17	1.15	1.13	1.01	1.30	2.34	1.28	1.09	.99	1.07	1.29

CAL YR 1981 TOTAL 25174 MEAN 69.0 MAX 206 MIN 46 CFSM 1.10 IN 14.86
WTR YR 1982 TOTAL 25943 MEAN 71.1 MAX 316 MIN 48 CFSM 1.13 IN 15.32

04130000 CHEBOYGAN RIVER NEAR CHEBOYGAN, MI

LOCATION.--Lat 45°34'38", long 84°29'15", in SW¼ sec.19, T.37 N., R.1 W., Cheboygan County, Hydrologic Unit 04070004, on right bank 300 ft (91 m) downstream from Mullett Lake, 2.4 mi (3.9 km) upstream from Black River, and 4.8 mi (7.7 km) south of Cheboygan.

DRAINAGE AREA.--865 mi² (2,240 km²).

PERIOD OF RECORD.--October 1942 to September 1982 (discontinued). Monthly discharge only for October 1942, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 591.21 ft (180.201 m) National Geodetic Vertical Datum of 1929. Auxiliary water-stage recorder 5.1 mi (8.2 km) downstream from base gage, in Cheboygan, datum of gage is 590.00 ft (179.832 m) National Geodetic Vertical Datum of 1929. Prior to Aug. 30, 1967, nonrecording auxiliary gage in Cheboygan, 5.2 mi (8.4 km) downstream at present datum.

REMARKS.--Records good. Flow regulated by dam in Cheboygan; prior to Dec. 31, 1965, flow affected by variable backwater from powerplant in Cheboygan 5.2 mi (8.4 km) below station and by Alverno powerplant.

AVERAGE DISCHARGE.--40 years, 822 ft³/s (23.28 m³/s), 12.90 in/yr (328 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 1,970 ft³/s (55.8 m³/s) May 22, 1979; maximum daily gage height, 3.27 ft (0.997 m) May 13, 14, 1960; minimum daily discharge, 90 ft³/s (2.55 m³/s) Mar. 29, 30, 1958; minimum daily gage height, 1.05 ft (0.320 m) Apr. 13, 14, 15, 1975.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 1,490 ft³/s (42.2 m³/s) May 3; maximum daily gage height, 2.67 ft (0.814 m) June 1; minimum daily discharge, 264 ft³/s (7.48 m³/s) July 16; minimum daily gage height, 1.34 ft (0.408 m) Mar. 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	491	614	691	792	749	649	890	1420	513	671	421	296
2	553	677	712	687	745	645	910	1460	919	656	505	407
3	734	779	755	596	756	649	870	1490	941	660	358	749
4	696	807	766	731	743	673	964	1240	940	682	356	764
5	454	888	761	745	729	665	973	612	940	656	534	493
6	518	921	753	606	726	673	994	631	937	594	819	608
7	638	894	741	698	716	686	858	642	926	829	936	585
8	693	880	739	865	725	701	841	683	933	668	1130	865
9	801	892	740	895	738	708	824	674	807	657	957	816
10	798	878	746	916	733	688	799	651	575	688	537	579
11	797	960	719	1010	735	697	839	770	703	697	385	499
12	789	966	700	886	735	685	829	939	884	634	290	489
13	778	956	690	898	730	631	814	942	883	550	356	819
14	883	958	624	898	725	637	669	950	830	430	419	893
15	935	952	769	904	723	648	655	947	535	553	429	973
16	706	937	896	924	728	654	630	939	412	264	412	1100
17	877	824	955	1050	741	663	759	945	412	321	450	1090
18	669	763	915	893	719	615	1010	878	519	466	422	1100
19	878	805	1080	900	713	628	1090	867	704	488	440	1090
20	606	849	953	921	705	690	1300	1040	785	645	404	1080
21	629	844	801	932	703	691	1430	1070	650	853	294	1050
22	625	798	800	927	694	741	1480	1000	669	938	355	990
23	621	739	908	974	707	824	1460	819	550	1130	858	1030
24	610	548	648	962	659	792	1450	641	497	1130	963	1040
25	582	541	574	933	652	805	1450	401	519	1120	758	964
26	617	526	747	921	643	879	1470	539	725	896	467	865
27	662	530	580	902	648	937	1480	650	590	488	566	1020
28	899	549	642	880	648	868	1470	546	683	317	785	1020
29	878	559	568	745	---	859	1480	419	656	362	773	1010
30	626	573	668	745	---	836	1460	431	677	574	767	1010
31	598	---	553	764	---	792	---	404	---	432	620	---
TOTAL	21641	23407	23194	26500	19968	22349	32148	25640	21314	20049	17766	25294
MEAN	698	780	748	855	713	721	1072	827	710	647	573	843
MAX	935	966	1080	1050	756	937	1480	1490	941	1130	1130	1100
MIN	454	526	553	596	643	615	630	401	412	264	290	296
CFSM	.81	.90	.87	.99	.82	.83	1.24	.96	.82	.75	.66	.98
IN.	.93	1.01	1.00	1.14	.86	.96	1.38	1.10	.92	.86	.76	1.09

CAL YR 1981 TOTAL 265344 MEAN 727 MAX 1240 MIN 266 CFSM .84 IN 11.41
WTR YR 1982 TOTAL 279270 MEAN 765 MAX 1490 MIN 264 CFSM .88 IN 12.01

04130500 BLACK RIVER NEAR TOWER, MI

LOCATION.--Lat 45°23'33", long 84°20'00", in SE¼ NE¼ sec.29, T.35 N., R.1 E., Cheboygan County, Hydrologic Unit 04070005, on right bank 400 ft (122 m) downstream from Kleber Dam, 1,000 ft (305 m) upstream from Milligan Creek, 3.0 mi (4.8 km) northwest of Tower, and 10.8 mi (17.4 km) unstream from Black Lake.

DRAINAGE AREA.--313 mi² (811 km²).

PERIOD OF RECORD.--October 1942 to current year. Monthly discharge only for October 1942, published in WSP 1307.

REVISED RECORDS.--WSP 1307: 1942.

GAGE.--Water-stage recorder. Datum of gage is 658.00 ft (200.558 m) Stanley Engineering Co. datum. Prior to Aug. 1, 1949, at site 1 mi (1.6 km) upstream at different datum.

REMARKS.--Records good except those for the period of no gage-height record, Mar. 17 to Apr. 20, which are poor. Flow regulated by hydroelectric powerplant 400 ft (122 m) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--40 years, 269 ft³/s (7.618 m³/s), 11.67 in/yr (296 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,340 ft³/s (66.3 m³/s) Apr. 17, 1960, gage height, 7.13 ft (2.173 m); minimum, 0.60 ft³/s (0.017 m³/s) Mar. 11, 1950; minimum daily, 4.0 ft³/s (0.11 m³/s) Nov. 27, 1949.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 945 ft³/s (26.8 m³/s) Apr. 20, gage height, 4.59 ft (1.399 m) but may have been greater during period of no gage height record, Mar. 17 to Apr. 20; minimum, 17 ft³/s (0.48 m³/s) May 12, gage height 1.29 ft (0.393 m); minimum daily, 112 ft³/s (3.17 m³/s) Aug. 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	165	164	205	174	173	164	450	421	413	156	125	146
2	210	162	187	175	171	171	520	362	455	155	132	160
3	217	168	178	160	170	174	600	323	470	154	208	182
4	307	187	211	164	172	173	680	278	299	153	224	175
5	247	171	237	152	172	173	700	285	234	151	224	180
6	265	174	241	152	173	174	660	310	202	148	250	194
7	171	175	212	174	173	174	580	290	201	149	204	218
8	399	180	188	177	173	174	470	295	203	151	198	208
9	241	187	203	197	174	173	400	258	201	151	184	209
10	260	176	173	171	174	171	420	277	234	149	177	183
11	250	177	171	145	173	170	460	255	211	150	178	175
12	240	177	151	157	174	169	420	262	163	155	163	170
13	235	177	209	189	174	169	400	263	184	154	143	168
14	230	155	211	192	172	186	410	278	181	153	132	205
15	230	172	199	187	142	201	490	256	200	173	112	251
16	230	170	177	185	150	227	650	225	198	164	136	288
17	230	163	159	174	170	270	800	235	211	177	140	219
18	230	163	141	174	153	310	880	217	224	248	141	208
19	230	163	135	174	163	340	940	274	233	190	137	259
20	213	165	127	174	163	270	945	260	230	167	129	231
21	219	138	128	174	187	255	885	238	224	159	129	296
22	233	169	160	174	191	240	788	260	232	158	130	333
23	233	185	176	174	190	205	725	227	230	157	149	260
24	233	191	183	175	173	280	655	217	192	156	130	260
25	221	189	174	176	176	300	612	207	191	153	138	247
26	190	151	159	175	168	380	622	200	167	134	146	199
27	192	224	167	173	168	360	620	229	166	126	155	225
28	215	264	163	170	170	340	561	227	171	126	155	211
29	163	323	174	169	---	320	505	209	162	126	155	208
30	141	307	205	169	---	305	485	184	174	126	140	198
31	139	---	173	171	---	290	---	194	---	127	130	---
TOTAL	6979	5567	5577	5337	4782	7418	18333	8006	6856	4796	4894	6466
MEAN	225	186	180	172	171	239	611	258	229	155	158	216
MAX	399	323	241	192	191	380	945	421	470	248	250	333
MIN	139	138	127	145	142	164	400	184	162	126	112	146
CFSM	.72	.59	.58	.55	.55	.76	1.95	.82	.73	.50	.51	.69
IN.	.83	.66	.66	.63	.57	.88	2.18	.95	.81	.57	.58	.77

CAL YR 1981 TOTAL 77189 MEAN 211 MAX 545 MIN 103 CFSM .67 IN 9.17
WTR YR 1982 TOTAL 85011 MEAN 233 MAX 945 MIN 112 CFSM .74 IN 10.10

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI
(National stream-quality accounting network and pesticide station)

LOCATION.--Lat 45°38'02", long 84°28'52", in NW¼ NE¼ sec.6, T.37 N., R.1 W., Cheboygan County, Hydrologic Unit 04070004, at upstream side of bridge on Lincoln Avenue in Cheboygan, 1.75 mi (2.8 km) upstream from mouth.

DRAINAGE AREA.--1,500 mi² (3,900 km²), approximately.

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to September 1981.
WATER TEMPERATURES: October 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor October 1976 to September 1981.

REMARKS.--Bimonthly samples are collected as a cross-section sample at Lincoln Ave. bridge. Water-discharge measurements are made at times of sampling. Flow regulated by dam 1,000 ft (305 m) downstream.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1975-81): Maximum daily recorded, 900 micromhos Apr. 24, 25, 1975; minimum daily recorded, 140 micromhos Mar. 8, 1975.
WATER TEMPERATURES (water years 1976-81): Maximum, 27.0°C July 20, 1977, July 8, 12, 13, 1981; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV												
17...	1145	1230	309	8.3	5.0	12.2	98	K2	K2	160	6.0	41
JAN												
21...	1000	1240	322	8.1	.0	14.3	97	K24	K590	170	18	44
MAR												
25...	0930	1330	357	8.0	1.5	13.9	101	K4	41	180	7.0	46
MAY												
20...	0930	1150	305	8.2	14.0	11.0	108	K12	27	160	6.0	41
JUL												
22...	0800	1220	303	8.3	22.5	9.1	105	46	95	150	11	40
SEP												
23...	0915	1440	296	8.2	14.5	9.8	96	33	K15	160	12	41

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
NOV												
17...	13	4.3	6	.7	150	13	5.1	.2	7.9	191	175	.26
JAN												
21...	14	4.1	5	.7	150	15	6.0	.2	7.2	190	185	.26
MAR												
25...	15	4.8	6	.8	170	13	6.3	.2	8.4	189	197	.26
MAY												
20...	13	3.6	5	.6	150	13	5.0	.2	6.7	188	173	.26
JUL												
22...	13	3.9	5	.4	140	14	5.0	.2	6.1	173	168	.24
SEP												
23...	13	4.2	6	.8	140	11	5.0	.3	7.3	175	169	.24

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV												
17...	634	.06	.020	.03	.28	.020	.06	.010	<.010	2	6.6	100
JAN												
21...	636	.05	.010	.01	.42	<.010	--	<.010	<.010	6	20	100
MAR												
25...	679	.07	.090	.12	.25	.060	.18	.050	.030	2	7.2	100
MAY												
20...	584	<.10	<.010	.01	.23	.030	.09	.010	<.010	4	12	100
JUL												
22...	570	<.10	.020	.03	.40	.010	.03	<.010	<.010	3	9.9	100
SEP												
23...	680	<.10	.020	.03	.30	.040	.12	.030	.040	1	3.9	100

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
NOV										
17...	1145	1	1	100	20	<1	<1	10	<10	<1
MAR										
25...	0930	1	1	100	21	2	<1	10	<10	1
MAY										
20...	0930	1	1	<100	20	1	<1	20	10	<1
SEP										
23...	0915	1	1	<100	18	1	<1	10	10	3

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
NOV										
17...	<1	9	5	80	6	4	<1	10	<1	<.1
MAR										
25...	<1	10	2	90	10	10	1	<10	4	<.1
MAY										
20...	<1	10	6	60	3	3	3	<10	1	<.1
SEP										
23...	<1	9	2	30	7	11	<1	<10	<1	<.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
NOV									
17...	<.1	3	1	<1	<1	<1	<1	50	<4
MAR									
25...	<.1	3	<1	<1	<1	<1	<1	120	6
MAY									
20...	<.1	--	6	<1	<1	<1	<1	30	3
SEP									
23...	<.1	2	1	<1	<1	<1	<1	80	<4

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	PCB, TOTAL (UG/L)	PCB, TOTAL IN BOTTOM MATERIAL (UG/KG)	ALDRIN, TOTAL (UG/L)	ALDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	CHLORDANE, TOTAL (UG/L)	CHLORDANE, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDD, TOTAL (UG/L)	DDD, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDE, TOTAL (UG/L)	DDE, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDT, TOTAL (UG/L)
NOV												
17...	1145	--	3	--	<.1	--	2.0	--	<.1	--	<.1	--
MAR												
25...	0930	<.10	--	<.01	--	<.10	--	<.01	--	<.01	--	<.01
MAY												
20...	0930	<.10	2	<.01	<.1	<.10	<1.0	<.01	2.3	<.01	2.0	<.01

DATE	DDT, TOTAL IN BOTTOM MATERIAL (UG/KG)	DIAZINON, TOTAL (UG/L)	DIELDRIN TOTAL (UG/L)	DIELDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ENDOSULFAN, TOTAL (UG/L)	ENDOSULFAN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ENDRIN, TOTAL (UG/L)	ENDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ETHION, TOTAL (UG/L)	HEPTACHLOR, TOTAL (UG/L)	HEPTACHLOR, TOTAL IN BOTTOM MATERIAL (UG/KG)	HEPTACHLOR EPOXIDE TOTAL (UG/L)
NOV												
17...	<.1	--	--	<.1	--	<.1	--	<.1	--	--	<.1	--
MAR												
25...	--	<.01	<.01	--	<.01	--	<.01	--	<.01	<.01	--	<.01
MAY												
20...	<.1	<.01	<.01	<.1	<.01	<.1	<.01	<.1	<.01	<.01	<.1	<.01

DATE	HEPTACHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG)	LINDANE TOTAL (UG/L)	LINDANE TOTAL IN BOTTOM MATERIAL (UG/KG)	MALATHION, TOTAL (UG/L)	METHOXYCHLOR, TOTAL (UG/L)	METHOXYCHLOR, TOT. IN BOTTOM MATL. (UG/KG)	METHYL PARATHION, TOTAL (UG/L)	METHYL TRITHION, TOTAL (UG/L)	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L)	PCN, TOTAL IN BOTTOM MATERIAL (UG/KG)	MIREX, TOTAL (UG/L)
NOV											
17...	<.1	--	<.1	--	--	<.1	--	--	--	<1.0	--
MAR											
25...	--	<.01	--	<.01	<.01	--	<.01	<.01	<.10	--	<.01
MAY											
20...	<.1	<.01	<.1	<.01	<.01	<.1	<.01	<.01	<.10	<1.0	<.01

DATE	MIREX, TOTAL IN BOTTOM MATERIAL (UG/KG)	PARATHION, TOTAL (UG/L)	PERTHANE IN BOTTOM MATERIL (UG/KG)	PERTHANE TOTAL (UG/L)	TOXAPHENE, TOTAL (UG/L)	TOXAPHENE, TOTAL IN BOTTOM MATERIAL (UG/KG)	TOTAL TRITHION (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
NOV											
17...	<.1	--	<.10	--	--	<1.0	--	--	--	--	--
MAR											
25...	--	<.01	--	<.10	<1	--	<.01	<.01	<.01	<.01	<.01
MAY											
20...	<.1	<.01	<1.00	<.10	<1	<10	<.01	.03	<.01	<.01	<.01

04135000 THUNDER BAY RIVER NEAR ALPENA, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°05'39", long 83°29'59", in SW¼ SE¼ sec.7, T.31 N., R.8 E., Alpena County, Hydrologic Unit 04070006, on left bank 1,000 ft (305 m) downstream from Alpena Power Company Fourmile Dam, 2.5 mi (4.0 km) upstream from Bagley Street in Alpena and 6.0 mi (9.7 km) upstream from mouth.

DRAINAGE AREA.--1,238 mi² (3,206 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional measurements made water years 1945-50. October 1979 to current year.

GAGE.--Two water-stage recorders. Altitude of gage on main (north) channel and secondary gage on (south) channel is 615 ft (187 m), from topographic map.

REMARKS.--Water-discharge records good except those for the periods of no gage-height record, Oct. 16 to Nov. 18, Dec. 21 to Jan. 20, June 10 to Aug. 20, which are fair. Flow regulated at all stages by hydroelectric plant 1,000 ft (305 m) above station.

COOPERATION.--Supplemental record furnished by Alpena Power Co.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 3,670 ft³/s (104 m³/s) Apr. 21, 1982; minimum daily, 33 ft³/s (0.93 m³/s) Oct. 4, 1980.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 3,670 ft³/s (104 m³/s) Apr. 21; minimum daily, 34 ft³/s (0.96 m³/s) Sept. 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	560	208	691	100	504	717	1330	705	792	608	222	546
2	629	776	710	360	466	714	1360	273	770	568	876	535
3	114	630	726	300	584	689	1700	971	519	208	765	540
4	394	572	659	570	753	575	3450	703	446	85	1030	34
5	797	665	522	460	567	736	3070	880	613	550	930	116
6	736	549	539	460	161	460	2570	857	346	510	1140	623
7	767	106	423	410	224	409	2570	685	85	470	440	546
8	684	74	641	380	707	615	2420	254	573	500	856	653
9	1090	639	595	331	612	710	1590	236	823	500	1040	650
10	597	368	610	343	620	612	1600	844	718	65	1010	682
11	762	419	575	385	621	622	1610	766	597	131	688	85
12	712	629	126	475	575	714	1520	599	80	631	750	44
13	944	738	73	496	211	481	1520	622	89	531	632	674
14	592	68	466	518	485	629	1520	630	358	561	56	548
15	747	106	500	506	620	834	1530	47	690	581	179	525
16	747	727	561	526	615	852	2330	213	924	602	646	499
17	43	628	525	516	615	858	3170	721	769	44	586	507
18	218	636	549	536	498	1110	3010	661	1120	143	611	71
19	1010	635	219	526	417	1120	3060	465	508	483	504	95
20	686	657	146	536	426	1090	3180	598	405	574	310	667
21	686	89	488	549	431	1090	3670	620	828	554	36	573
22	686	118	367	584	751	1060	2420	480	1030	482	118	594
23	705	685	317	296	632	740	2290	237	1010	443	486	698
24	1210	621	378	402	712	550	2080	618	946	50	462	559
25	256	729	199	522	749	890	1670	612	1010	143	464	433
26	408	242	269	619	743	1090	1210	587	455	422	474	111
27	526	881	239	561	460	1070	1040	611	218	395	541	763
28	486	516	509	378	532	927	1050	743	789	562	106	695
29	556	507	469	686	---	1230	1120	410	798	469	87	786
30	626	939	519	257	---	1020	972	100	769	486	591	720
31	146	---	409	626	---	1290	---	938	---	96	492	---
TOTAL	19039	15057	14419	15842	15498	25494	62092	17686	19120	12447	17128	14582
MEAN	614	502	465	453	560	822	2070	571	637	402	553	486
MAX	1210	939	823	626	753	1290	3670	971	1120	631	1140	786
MIN	43	68	73	100	161	489	972	47	45	44	36	34
CFSM	.50	.41	.38	.37	.45	.66	1.67	.46	.52	.33	.45	.39
IN.	.57	.45	.43	.42	.47	.77	1.87	.53	.57	.37	.51	.44

CAL YR 1981 TOTAL 226497 MEAN 621 MAX 1490 MIN 48 CFSM .50 IN 6.81
WTR YR 1982 TOTAL 246796 MEAN 675 MAX 3670 MIN 34 CFSM .55 IN 7.42

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1979 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1979 to current year.
WATER TEMPERATURE: October 1979 to current year.

INSTRUMENTATION.--Water-quality monitor since October 1980.

REMARKS.--In addition to water-quality monitor, samples were collected by a local observer on an approximate twice-weekly basis. Occasional samples are collected at Bagley Street bridge, 2.5 mi (4.0 km) downstream. Water-discharge measurements are made at times of monthly sampling. February 1979 to September 1979, samples collected at site 6.9 mi (11.1 km) downstream (04135020).

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum,511 microshos Jan. 2, 1982; minimum, 120 microshos was observed Dec. 19, 1981.
WATER TEMPERATURES: Maximum, 31.0°C July 11, 12, 1981; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 511 microshos Jan. 2; minimum, 120 microshos was observed Dec. 19.
WATER TEMPERATURES: Maximum, 28.5°C July 17, 24; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV												
18...	0800	475	366	8.2	4.0	12.2	94	<1	<2	190	7.0	50
JAN												
20...	1000	461	418	7.9	.0	10.6	73	<6	28	210	1.0	58
MAR												
24...	0930	494	434	7.7	.0	10.2	72	<3	60	220	16	57
MAY												
19...	0930	434	356	8.2	18.5	8.7	95	<1	41	190	11	52
JUL												
21...	0815	439	326	8.0	23.0	8.3	97	--	67	160	4.0	42
SEP												
22...	0930	1190	335	8.1	15.0	9.6	94	<1	--	180	30	47

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
NOV												
18...	15	6.8	7	.8	180	14	5.7	.2	7.8	226	209	.31
JAN												
20...	16	6.2	6	.9	210	15	6.2	.2	8.5	242	230	.33
MAR												
24...	18	7.3	7	1.0	200	15	7.2	.2	11	243	237	.33
MAY												
19...	14	4.2	5	.9	180	13	5.1	.2	5.0	231	201	.31
JUL												
21...	14	5.5	7	.1	160	11	5.6	.2	7.4	177	181	.24
SEP												
22...	14	5.3	6	.7	170	10	5.0	.2	8.9	204	178	.28

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV												
18...	290	.10	.020	.03	.32	.020	.06	.010	<.010	3	3.8	100
JAN												
20...	301	.14	.140	.18	.40	<.010	--	.010	<.010	1	1.2	100
MAR												
24...	324	.14	.210	.27	.50	.010	.03	<.010	<.010	4	5.3	100
MAY												
19...	271	<.10	<.010	.01	.36	.030	.09	<.010	<.010	5	5.9	100
JUL												
21...	210	<.10	.020	.03	.50	.020	.06	<.010	<.010	1	1.2	100
SEP												
22...	658	<.10	.020	.03	.20	.040	.12	.040	.020	8	26	100

STREAMS TRIBUTARY TO LAKE HURON

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
NOV 18...	0800	1	1	100	20	<1	<1	10	<10	<1
MAR 24...	0930	1	1	100	31	<1	<1	10	<10	1
MAY 19...	0930	2	1	<100	26	<1	1	10	<10	<1
SEP 22...	0930	1	1	<100	26	1	<1	10	10	2

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
NOV 18...	<1	5	2	150	19	3	1	30	6	--
MAR 24...	<1	7	2	200	38	2	1	30	18	<.1
MAY 19...	<1	3	3	130	12	2	2	40	2	<.1
SEP 22...	<1	5	2	90	19	5	1	30	2	<.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
NOV 18...	.2	2	1	<1	<1	<1	<1	80	8
MAR 24...	<.1	1	<1	<1	<1	<1	<1	30	11
MAY 19...	<.1	3	3	<1	<1	<1	<1	30	18
SEP 22...	<.1	2	1	<1	<1	<1	<1	50	5

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	11.0	8.0	10.5	11.0	6.0	7.5	1.0	.0	1.0	.5	.0	.0
2	10.5	7.0	9.5	7.5	6.5	7.0	2.0	1.0	1.0	.0	.0	.0
3	15.0	5.0	9.0	7.5	3.0	6.0	2.0	.5	1.0	1.0	.0	.0
4	9.5	5.5	9.0	7.5	3.5	6.0	1.5	.5	1.0	.0	.0	.0
5	9.5	9.0	9.0	8.5	6.0	7.5	1.0	1.0	1.0	.0	.0	.0
6	10.0	9.0	9.0	8.0	5.0	7.0	1.0	1.0	1.0	.5	.0	.0
7	9.0	7.5	8.5	11.0	2.5	6.0	2.0	1.0	1.0	.0	.0	.0
8	9.0	5.0	8.0	10.5	3.0	5.5	1.0	.0	1.0	.0	.0	.0
9	8.5	8.0	8.5	6.5	2.0	5.0	.5	.0	.0	.0	.0	.0
10	9.0	8.5	8.5	5.5	2.0	4.0	.5	.0	.0	.0	.0	.0
11	9.0	8.5	9.0	5.0	3.0	4.0	.0	.0	.0	.0	.0	.0
12	9.5	8.5	9.0	4.5	1.5	3.5	.0	.0	.0	.0	.0	.0
13	9.5	9.0	9.0	4.0	1.5	3.0	1.0	.0	.0	.0	.0	.0
14	9.5	7.0	9.0	7.5	1.0	3.5	.5	.0	.0	.0	.0	.0
15	10.0	9.5	10.0	8.0	1.5	4.0	.5	.0	.0	.0	.0	.0
16	10.0	5.5	8.5	4.0	3.5	3.5	.5	.0	.5	.0	.0	.0
17	14.0	5.0	9.5	4.0	2.0	3.5	.5	.0	.0	.0	.0	.0
18	11.5	9.0	10.0	4.0	2.0	3.5	.5	.0	.5	.0	.0	.0
19	9.0	6.5	8.5	4.5	3.0	3.5	.5	.0	.0	.0	.0	.0
20	8.0	5.0	7.0	3.5	2.0	3.0	.5	.0	.0	.0	.0	.0
21	7.0	3.0	6.0	2.0	.0	1.0	.5	.0	.5	.0	.0	.0
22	7.0	4.0	6.0	2.0	.0	.5	1.0	.5	.5	.0	.0	.0
23	6.5	3.0	5.5	2.5	.0	1.0	3.0	.0	.5	.0	.0	.0
24	6.5	1.5	4.0	1.5	.0	.5	.5	.0	.0	.0	.0	.0
25	7.0	3.0	4.5	1.0	.0	.5	.5	.0	.0	.0	.0	.0
26	5.5	4.0	5.0	2.0	1.0	1.5	.5	.0	.0	.0	.0	.0
27	5.5	3.5	5.0	1.5	1.0	1.5	.5	.0	.0	.0	.0	.0
28	5.5	2.5	4.5	1.5	1.0	1.0	.5	.0	.0	.0	.0	.0
29	5.5	4.0	5.0	1.0	1.0	1.0	.5	.0	.0	.0	.0	.0
30	6.0	5.0	5.5	1.5	1.0	1.0	.5	.0	.0	.0	.0	.0
31	11.5	5.0	7.0	---	---	---	.5	.0	.0	.0	.0	.0
MONTH	15.0	1.5	7.5	11.0	.0	3.5	3.0	.0	.5	1.0	.0	.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	.0	.0	.0	13.5	9.0	12.5
2	.0	.0	.0	.0	.0	.0	.0	.0	.0	19.0	7.5	12.5
3	.0	.0	.0	.0	.0	.0	.0	.0	.0	14.5	11.5	13.5
4	.0	.0	.0	.0	.0	.0	.0	.0	.0	14.5	8.5	12.5
5	.0	.0	.0	.0	.0	.0	.0	.0	.0	14.5	14.0	14.0
6	1.0	.0	.0	.0	.0	.0	.0	.0	.0	15.5	14.5	15.0
7	.0	.0	.0	.0	.0	.0	.5	.0	.0	15.5	13.5	15.0
8	.0	.0	.0	.0	.0	.0	.5	.0	.0	20.0	11.5	16.0
9	.0	.0	.0	.0	.0	.0	.5	.0	.5	20.5	9.5	14.0
10	.0	.0	.0	.0	.0	.0	.5	.5	.5	16.0	15.5	15.5
11	.0	.0	.0	.5	.0	.0	.5	.5	.5	16.0	14.5	15.5
12	.0	.0	.0	.0	.0	.0	1.0	.5	.5	17.0	13.5	15.5
13	3.0	.0	.5	.0	.0	.0	1.0	.5	1.0	16.5	13.5	15.5
14	.0	.0	.0	.0	.0	.0	1.5	1.0	1.0	17.0	13.0	15.5
15	.0	.0	.0	.0	.0	.0	2.5	1.5	2.0	21.0	14.5	17.0
16	.0	.0	.0	.0	.0	.0	3.5	2.5	3.0	17.5	15.5	16.5
17	.0	.0	.0	.0	.0	.0	4.0	3.5	4.0	17.5	16.0	17.0
18	.0	.0	.0	.0	.0	.0	5.0	3.5	4.0	18.5	13.5	16.5
19	.0	.0	.0	.0	.0	.0	5.0	4.5	5.0	19.0	16.0	18.0
20	.0	.0	.0	.0	.0	.0	5.0	3.5	4.5	19.5	16.0	18.0
21	.0	.0	.0	.0	.0	.0	4.5	3.5	4.0	19.0	13.5	17.0
22	.0	.0	.0	.0	.0	.0	5.0	4.0	4.5	19.0	18.0	18.5
23	.0	.0	.0	.5	.0	.0	7.0	5.0	6.0	17.5	15.0	16.0
24	.0	.0	.0	.0	.0	.0	9.5	7.0	8.5	17.0	14.0	16.0
25	.0	.0	.0	.0	.0	.0	11.5	9.5	10.5	17.0	13.0	15.5
26	.0	.0	.0	.0	.0	.0	12.5	11.5	12.0	17.5	12.0	15.5
27	.0	.0	.0	.0	.0	.0	12.5	11.5	12.0	18.0	14.0	16.5
28	.0	.0	.0	.5	.0	.0	12.0	11.0	11.5	18.5	15.0	17.5
29	---	---	---	.5	.0	.0	12.5	11.5	11.5	19.5	18.5	19.0
30	---	---	---	.0	.0	.0	12.5	11.5	12.0	21.0	17.0	19.5
31	---	---	---	.0	.0	.0	---	---	---	24.5	15.5	18.5
MONTH	3.0	.0	.0	.5	.0	.0	12.5	.0	4.0	24.5	7.5	16.0

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	20.0	13.5	18.5	20.5	15.5	18.5	27.0	19.5	22.5	17.5	16.0	17.0
2	20.0	19.5	19.5	20.5	16.0	19.0	23.0	19.5	22.5	17.5	15.0	16.5
3	19.5	19.0	19.0	22.5	17.5	20.0	21.5	18.5	20.5	17.0	13.0	15.5
4	19.5	18.5	19.0	24.5	16.0	19.5	21.0	21.0	21.0	23.0	13.0	17.0
5	19.5	18.5	19.0	21.0	15.5	19.0	21.0	20.5	21.0	19.0	13.0	16.5
6	19.5	18.5	19.0	22.0	18.5	20.5	21.5	20.5	21.0	17.5	15.5	17.0
7	19.5	16.5	18.5	23.5	20.5	22.0	22.0	21.0	21.5	17.0	12.5	15.0
8	20.0	18.0	19.0	24.0	19.5	21.5	23.0	22.0	22.5	17.5	12.5	15.5
9	20.0	15.5	18.5	24.0	19.0	22.0	23.0	22.5	22.5	18.0	14.5	16.5
10	20.5	16.5	19.0	28.0	21.0	23.5	22.0	21.0	21.5	18.5	15.0	17.5
11	20.5	15.0	18.5	27.5	21.0	23.0	21.0	15.5	19.0	26.5	16.5	19.5
12	24.0	16.0	18.5	23.5	18.5	22.5	20.5	15.0	18.5	26.0	16.5	20.0
13	21.5	15.5	18.5	22.0	18.0	20.5	20.0	16.0	18.5	20.5	18.5	19.5
14	20.0	14.0	18.0	22.5	19.0	21.0	24.5	16.0	20.0	21.0	18.0	20.5
15	20.0	16.5	19.0	22.5	19.0	21.5	23.5	16.5	19.0	20.0	16.5	18.5
16	19.5	16.0	19.0	23.5	20.0	22.5	21.5	17.5	20.5	19.0	13.0	17.0
17	18.5	15.0	17.5	28.5	21.5	24.0	22.0	17.5	20.0	18.0	14.5	16.5
18	18.0	17.5	18.0	27.0	20.5	22.5	22.0	17.0	20.5	20.0	12.0	15.5
19	18.0	17.0	17.5	24.0	19.5	22.0	22.5	18.5	21.0	21.5	11.5	16.0
20	17.5	17.0	17.0	23.5	19.0	22.0	22.5	19.0	20.5	16.5	13.5	16.0
21	17.5	16.5	17.0	23.5	18.5	22.0	25.5	18.0	21.0	15.5	12.5	14.5
22	17.5	16.5	17.0	24.0	20.5	22.0	21.5	18.0	19.5	15.0	12.5	14.0
23	17.5	16.5	17.0	24.0	20.0	22.0	21.5	17.0	19.5	15.0	11.0	13.5
24	18.0	17.0	17.5	28.5	19.5	23.5	21.0	17.5	19.5	14.5	13.0	14.0
25	18.5	18.0	18.0	28.0	21.0	23.5	21.0	17.0	19.5	14.5	13.5	14.0
26	18.5	16.5	18.0	24.5	20.5	23.0	20.5	17.5	19.5	19.0	14.0	15.5
27	23.5	14.0	17.5	24.0	20.5	22.5	20.0	15.5	18.5	15.0	14.0	15.0
28	20.0	18.5	19.0	24.0	19.5	22.0	22.5	14.0	18.0	15.0	13.0	14.5
29	20.5	19.5	20.0	23.5	18.5	21.5	18.0	14.0	16.0	15.5	15.0	15.5
30	20.5	17.5	20.0	23.0	20.0	21.5	18.5	15.5	17.5	17.0	15.5	16.0
31	---	---	---	27.0	19.5	22.5	17.5	15.0	16.5	---	---	---
MONTH	24.0	13.5	18.5	28.5	15.5	21.5	27.0	14.0	20.0	26.5	11.0	16.5

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	323	314	319	404	140	240	386	376	379	440	429	431
2	328	317	320	396	393	394	386	377	380	511	432	451
3	332	321	325	402	396	399	388	377	381	439	429	433
4	331	322	325	404	396	400	385	376	380	434	428	430
5	332	328	329	411	400	404	386	379	381	459	428	435
6	334	315	328	408	393	398	386	384	385	443	426	432
7	344	329	332	406	383	397	387	384	385	448	426	432
8	341	332	334	392	380	386	390	386	387	502	427	444
9	338	333	336	388	368	374	428	387	393	433	426	428
10	342	339	341	377	368	371	404	389	392	438	426	429
11	362	341	344	374	367	371	397	389	393	433	428	429
12	345	344	345	374	365	368	431	398	410	428	427	428
13	348	340	346	369	363	366	420	399	410	430	428	429
14	374	343	355	372	364	367	411	397	402	431	429	430
15	381	361	366	375	367	372	417	398	402	432	431	432
16	373	361	365	376	371	373	439	402	407	433	431	432
17	380	351	364	379	373	376	462	405	413	434	432	433
18	374	363	366	381	375	377	459	408	417	435	433	434
19	384	365	366	383	379	381	434	410	416	436	435	435
20	382	366	372	383	377	380	479	415	449	438	435	437
21	398	369	379	386	358	379	455	417	426	437	436	437
22	403	386	393	391	380	384	423	416	420	440	435	437
23	400	388	392	388	379	382	427	420	425	440	435	438
24	403	391	396	392	358	379	456	424	432	441	435	437
25	404	392	399	454	378	391	508	426	454	444	434	436
26	406	397	401	383	370	377	449	426	431	436	434	435
27	414	401	406	377	374	376	427	424	425	442	434	436
28	416	402	407	378	376	377	430	424	427	450	435	440
29	404	147	329	379	377	378	445	425	429	440	433	436
30	408	260	384	379	376	377	441	426	430	445	434	437
31	413	150	260	---	---	---	440	427	432	435	433	434
MONTH	416	147	356	454	140	376	508	376	409	511	426	434

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	440	434	435	429	425	428	399	381	392	311	302	305
2	460	436	444	434	430	432	378	348	362	312	307	309
3	454	435	441	452	434	435	347	337	340	312	306	309
4	435	433	434	468	436	447	341	337	339	314	309	311
5	437	433	434	448	434	437	341	337	340	310	307	308
6	459	438	444	435	434	434	344	339	341	312	305	308
7	447	435	439	441	435	436	345	341	343	375	309	323
8	438	435	437	447	437	440	347	344	345	394	361	376
9	441	437	439	441	438	439	346	344	345	393	370	380
10	443	440	441	444	439	441	344	341	343	389	372	376
11	443	442	443	446	438	441	341	337	339	386	365	375
12	444	439	442	448	437	441	338	334	336	396	342	375
13	509	444	457	440	436	438	333	330	332	386	356	374
14	446	441	443	438	435	437	331	327	328	384	373	378
15	444	440	442	437	434	435	327	323	325	386	374	380
16	443	440	441	434	430	432	325	320	322	397	363	376
17	442	440	441	432	424	428	319	310	315	366	362	364
18	450	429	442	427	424	425	309	306	307	372	362	365
19	441	437	439	438	426	431	306	301	303	373	356	362
20	440	437	438	444	438	442	300	295	298	366	359	363
21	438	434	436	443	439	441	295	291	293	368	361	364
22	435	431	433	440	436	438	293	290	291	364	360	362
23	434	431	432	440	435	437	296	289	292	367	360	363
24	433	429	431	454	434	439	299	296	297	367	359	362
25	430	427	428	431	426	428	300	295	298	370	359	362
26	428	426	427	424	415	420	301	296	298	368	360	364
27	426	425	425	414	409	412	301	297	299	368	361	364
28	427	424	426	411	405	408	301	298	300	369	360	363
29	---	---	---	408	404	406	303	298	301	366	361	363
30	---	---	---	410	404	406	305	300	303	380	364	368
31	---	---	---	407	399	404	---	---	---	376	362	369
MONTH	509	424	438	468	399	431	399	289	322	397	302	356

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	374	316	359	361	323	332	328	301	314	356	311	323
2	371	359	365	363	350	355	353	319	335	346	327	333
3	362	355	358	363	352	355	362	325	339	349	329	339
4	361	350	354	363	352	356	347	328	333	348	326	336
5	356	349	351	357	349	353	342	334	337	344	289	333
6	355	349	351	415	343	365	340	334	337	335	241	325
7	391	348	360	381	361	368	346	340	342	341	327	333
8	361	356	359	367	352	361	352	346	349	375	327	338
9	363	352	355	358	347	352	353	350	352	348	329	336
10	358	332	345	356	343	350	350	344	346	343	328	335
11	342	331	336	355	337	343	361	344	348	368	329	345
12	347	333	340	343	336	338	351	346	348	356	331	343
13	345	338	341	341	334	337	371	327	351	364	340	346
14	346	338	341	340	329	336	361	346	353	364	340	349
15	347	330	338	335	328	331	358	345	352	360	336	352
16	336	326	330	351	335	341	357	349	353	367	347	354
17	337	326	330	359	321	344	357	348	352	363	346	352
18	331	314	323	364	323	342	362	348	351	367	338	352
19	321	314	317	349	330	334	355	337	344	354	335	345
20	328	312	319	337	324	329	345	334	341	365	343	351
21	327	325	326	335	321	330	345	327	336	367	349	355
22	331	322	327	337	328	333	341	306	330	363	333	344
23	331	328	329	335	325	331	339	330	334	348	334	338
24	331	328	330	333	323	329	335	325	329	356	337	344
25	403	328	338	338	322	330	332	325	328	363	342	354
26	331	326	329	359	323	338	336	323	328	370	334	352
27	331	324	328	336	315	324	337	324	328	351	335	338
28	329	326	328	316	306	312	328	314	320	390	334	359
29	331	327	329	316	312	314	322	305	314	393	353	372
30	330	325	327	318	309	314	322	311	318	396	350	369
31	---	---	---	317	304	312	325	316	320	---	---	---
MONTH	403	312	339	415	304	338	371	301	337	396	241	345

04135500 AU SABLE RIVER AT GRAYLING, MI

LOCATION.--Lat 44°39'35", long 84°42'45", in SE¼ SE¼ sec.7, T.26 N., R.3 W., Crawford County, Hydrologic Unit 04070007, on right bank 65 ft (20 m) upstream from bridge on Interstate Highway 75 (Business Loop) in Grayling, 0.7 mi (1.1 km) upstream from East Branch, and 114 mi (183 km) upstream from mouth.

DRAINAGE AREA.--110 mi² (285 km²).

PERIOD OF RECORD.--October 1942 to current year. Monthly discharge only for some periods, published in WSP 1307. Prior to October 1954, published as Middle Branch Au Sable River at Grayling.

GAGE.--Water-stage recorder above steel-crested dam. Datum of gage is 1,123.49 ft (342.440 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Jan. 5 to Feb. 18, which are poor. Prior to Dec. 31, 1952, diurnal fluctuation caused by powerplant 2.5 mi (4.0 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--40 years, 74.2 ft³/s (2.101 m³/s), 9.16 in/yr (233 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 274 ft³/s (7.76 m³/s) June 2, 1943, gage height, 3.00 ft (0.914 m); minimum, 28 ft³/s (0.79 m³/s) Apr. 21, 1946, gage height, 0.80 ft (0.244 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 181 ft³/s (5.13 m³/s) Apr. 18, gage height, 2.30 ft (0.701 m); minimum, 45 ft³/s (1.27 m³/s) Jan. 1, 2, Feb. 26, gage height, 1.09 ft (0.332 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	58	52	56	47	52	54	85	91	63	50	58	55
2	52	53	57	47	52	50	95	86	65	50	57	56
3	53	52	58	52	52	47	95	84	63	51	59	57
4	51	51	58	54	52	48	95	78	60	50	65	58
5	51	51	56	51	52	49	95	76	58	49	66	57
6	58	51	55	51	52	49	92	77	56	48	62	56
7	64	52	54	52	52	49	85	76	55	48	59	56
8	64	52	54	52	52	49	81	73	55	47	57	57
9	59	52	53	52	52	49	80	71	59	47	55	54
10	55	51	50	52	52	52	78	70	59	48	54	52
11	53	50	48	52	52	53	78	69	57	52	55	50
12	51	51	53	52	52	53	76	69	55	54	54	50
13	48	51	53	52	52	60	84	67	55	57	53	50
14	50	51	53	52	52	61	90	67	54	84	53	52
15	56	50	52	52	52	60	102	66	56	112	53	55
16	54	50	52	52	52	61	126	65	61	93	53	56
17	55	50	49	52	52	60	170	64	64	79	51	56
18	57	50	47	52	52	59	178	64	64	91	50	57
19	63	50	49	52	52	57	163	63	63	103	50	57
20	66	53	51	52	52	56	162	63	63	90	53	57
21	63	53	51	52	53	56	157	60	64	74	58	58
22	59	52	51	52	54	56	141	60	62	66	58	59
23	57	51	52	52	54	55	131	62	59	62	56	57
24	56	49	52	52	54	58	129	63	56	60	55	58
25	55	47	50	52	49	61	127	63	55	58	57	66
26	55	53	48	52	47	61	122	61	56	57	56	81
27	55	61	51	52	51	58	117	62	56	59	54	80
28	55	64	52	52	53	56	110	66	55	63	53	71
29	54	61	52	52	---	59	103	65	54	64	53	64
30	53	58	51	52	---	63	97	63	52	62	55	60
31	53	---	52	52	---	75	---	61	---	60	55	---
TOTAL	1727	1572	1620	1602	1455	1734	3334	2125	1754	1988	1727	1752
MEAN	55.7	52.4	52.3	51.7	52.0	55.9	111	68.5	58.5	64.1	55.7	58.4
MAX	66	64	58	54	54	75	178	91	65	112	66	81
MIN	48	47	47	47	47	47	76	60	52	47	50	50
CFSM	.51	.48	.48	.47	.47	.51	1.01	.62	.53	.58	.51	.53
IN.	.58	.53	.55	.54	.49	.59	1.13	.72	.59	.67	.58	.59

CAL YR 1981 TOTAL 22556 MEAN 61.8 MAX 117 MIN 46 CFSM .56 IN 7.63
WTR YR 1982 TOTAL 22390 MEAN 61.3 MAX 178 MIN 47 CFSM .56 IN 7.57

04135600 EAST BRANCH AU SABLE RIVER AT GRAYLING, MI

LOCATION.--Lat 44°40'08", long 84°42'20", in NW¼ NW¼ sec.8, T.26 N., R.3 W., Crawford County, Hydrologic Unit 04070007, on right bank, at south boundary of Michigan Department of Natural Resources field office in Grayling, and 0.4 mi (0.6 km) upstream from mouth.

DRAINAGE AREA.--76.0 mi² (196.8 km²).

PERIOD OF RECORD.--April 1958 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,110 ft (338 m), from topographic map. Prior to Sept. 30, 1958, nonrecording gage at site 10 ft (3 m) downstream at present datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Jan. 5 to Apr. 9, which are poor. Occasional regulation by Michigan Department of Natural Resources ponds above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--24 years, 43.8 ft³/s (1.240 m³/s), 7.83 in/yr (199 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 207 ft³/s (5.86 m³/s) Mar. 28, 1976, gage height, 5.24 ft (1.597 m); minimum, 7.0 ft³/s (0.20 m³/s) Mar. 27, 1965, result of freezeup; minimum daily, 16 ft³/s (0.45 m³/s) Aug. 20, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 120 ft³/s (3.40 m³/s) Apr. 20, gage height, 4.33 ft (1.320 m); minimum, 15 ft³/s (0.42 m³/s) Dec. 17, gage height, 2.72 ft (0.829 m), but may have been less during period of no gage-height record Jan. 5 to Apr. 9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	34	28	31	20	22	23	40	61	41	28	30	29
2	33	28	32	24	22	23	45	58	39	30	31	32
3	31	28	32	26	22	23	49	56	37	29	34	35
4	27	27	31	28	22	23	52	54	35	29	37	33
5	26	27	31	28	22	23	50	53	34	29	35	30
6	38	28	30	27	22	22	51	53	33	28	33	31
7	41	29	30	26	22	22	51	53	32	28	31	31
8	36	28	30	26	22	22	50	51	32	27	29	29
9	33	28	28	25	22	22	48	50	31	26	28	27
10	31	28	25	24	22	22	47	49	31	26	28	27
11	30	28	29	24	22	22	45	48	37	31	27	26
12	29	27	29	23	22	23	45	47	38	31	28	26
13	28	27	28	23	22	24	49	46	33	36	27	26
14	29	27	28	23	22	25	53	45	32	57	27	29
15	32	27	27	23	22	26	61	44	36	52	27	30
16	33	27	27	23	22	27	83	44	40	43	26	30
17	32	28	22	23	22	27	108	43	37	44	26	29
18	35	27	26	22	22	28	112	42	36	59	26	31
19	37	27	26	22	23	28	108	41	37	51	27	29
20	35	28	25	22	23	28	117	43	37	43	38	30
21	33	28	25	22	23	28	115	41	38	38	33	30
22	32	28	26	22	23	29	100	40	37	37	31	31
23	31	27	26	22	23	29	93	42	34	35	31	30
24	31	24	26	22	23	30	91	42	33	32	31	31
25	31	25	22	22	23	32	89	42	34	31	32	49
26	31	31	24	22	23	33	83	39	32	31	30	48
27	31	39	26	22	23	32	77	39	31	36	29	41
28	30	37	25	22	23	32	72	39	31	38	28	38
29	29	33	25	22	---	33	67	39	30	35	28	37
30	28	32	25	22	---	34	64	39	29	36	29	35
31	28	---	23	22	---	36	---	37	---	32	28	---
TOTAL	985	856	840	724	626	831	2114	1420	1037	1108	925	960
MEAN	31.8	28.5	27.1	23.4	22.4	26.8	70.5	45.8	34.6	35.7	29.8	32.0
MAX	41	39	32	28	23	36	117	61	41	59	38	49
MIN	28	24	22	20	22	22	40	37	29	26	26	26
CFSM	.42	.38	.36	.31	.30	.35	.93	.60	.46	.47	.39	.42
IN.	.48	.42	.41	.35	.31	.41	1.03	.70	.51	.54	.45	.47

CAL YR 1981 TOTAL 12458 MEAN 34.1 MAX 73 MIN 22 CFSM .45 IN 6.10
WTR YR 1982 TOTAL 12426 MEAN 34.0 MAX 117 MIN 20 CFSM .45 IN 6.08

04135700 SOUTH BRANCH AU SABLE RIVER NEAR LUZERNE, MI

LOCATION.--Lat 44°36'53", long 84°27'20", in SE¼ SE¼ sec.29, T.26 N., R.1 W., Crawford County, Hydrologic Unit 04070007, on right bank 10 ft (3 m) upstream from Smith Bridge, 400 ft (122 m) downstream from bridge on State Highway 72, 4.6 mi (7.4 km) upstream from mouth, and 9.1 mi (14.6 km) west of Luzerne.

DRAINAGE AREA.--401 mi² (1,039 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1951-66. October 1966 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,070 ft (326 m), from topographic map. Apr. 19, 1951, to Nov. 14, 1966, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Occasional regulation by dams above station.

AVERAGE DISCHARGE.--16 years, 220 ft³/s (6.230 m³/s), 7.45 in/yr (189 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,120 ft³/s (31.7 m³/s) Mar. 28, 1976, gage height, 7.30 ft (2.225 m); minimum, 78 ft³/s (2.21 m³/s) Feb. 12, 1981, gage height, 3.98 ft (1.213 m), result of freeze up.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 718 ft³/s (20.3 m³/s) Apr. 18, 19, 20, gage height, 6.26 ft (1.908 m); minimum, 123 ft³/s (3.48 m³/s) Mar. 7, Aug. 18, 19, gage height, 4.25 ft (1.295 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	152	193	246	157	150	148	321	357	173	176	129	140
2	160	190	244	159	150	147	345	339	202	172	126	154
3	164	186	242	165	150	147	404	325	206	167	135	167
4	166	184	240	157	150	146	404	313	180	151	177	165
5	168	182	235	157	150	147	377	305	161	141	171	151
6	184	183	227	160	150	145	408	299	154	137	155	142
7	186	185	222	152	150	142	377	291	150	135	143	138
8	187	186	218	150	150	143	357	281	148	133	136	136
9	193	182	207	150	150	145	367	274	145	131	131	132
10	195	176	193	150	150	142	374	269	144	129	130	134
11	190	174	187	150	150	142	355	263	142	138	128	136
12	183	174	191	150	150	143	340	270	140	141	126	135
13	179	171	195	150	150	163	360	265	140	143	129	134
14	181	170	191	150	150	164	397	257	147	164	129	136
15	194	169	188	150	150	167	450	248	150	154	130	139
16	196	166	183	150	151	179	536	243	164	143	128	146
17	200	165	171	150	149	185	656	239	173	149	126	145
18	215	166	167	150	149	186	704	233	167	196	124	146
19	219	169	179	150	150	186	711	226	178	217	123	146
20	216	178	173	150	150	187	708	214	198	195	127	147
21	214	173	165	150	150	188	679	191	211	163	129	146
22	211	179	163	150	150	182	641	180	219	149	127	147
23	208	182	165	150	151	186	593	182	236	143	130	144
24	208	171	164	150	151	216	545	192	209	139	130	151
25	205	170	163	150	154	221	508	202	190	134	140	196
26	205	187	159	150	150	236	482	196	192	131	144	240
27	204	243	162	150	150	213	466	189	190	136	135	246
28	200	249	159	150	146	209	441	187	191	140	128	253
29	197	252	160	150	---	218	410	186	187	136	126	250
30	193	253	160	150	---	239	384	183	182	133	133	227
31	193	---	162	150	---	202	---	164	---	131	134	---
TOTAL	5966	5608	5881	4707	4201	5554	14100	7563	5269	4647	4159	4869
MEAN	192	187	190	152	150	179	470	244	176	150	134	162
MAX	219	253	246	165	154	202	711	357	236	217	177	253
MIN	152	165	159	150	146	142	321	164	140	129	123	132
CFSM	.48	.47	.47	.38	.37	.45	1.17	.61	.44	.37	.33	.40
IN.	.55	.52	.55	.44	.39	.52	1.31	.70	.49	.43	.39	.45

CAL YR 1981 TOTAL 71476 MEAN 196 MAX 487 MIN 101 CFSM .49 IN 6.63
WTR YR 1982 TOTAL 72524 MEAN 199 MAX 711 MIN 123 CFSM .50 IN 6.73

04135700 SOUTH BRANCH AU SABLE RIVER NEAR LUZERNE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: November 1966 to current year.

INSTRUMENTATION.--Temperature recorder since November 1966.

REMARKS.--Temperature recorder clock stopped Feb. 16-18 (range in temperature 0.0 to 1.5°C).

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 24.0°C July 16, 1968, July 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 21.0°C July 7, 8, 16, 17; minimum 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	8.5	8.0	8.5	7.5	1.0	1.0	.5	.5	.0	.0	2.0	1.0
2	8.0	7.0	8.0	6.0	1.5	1.0	.5	.5	.0	.0	1.5	.5
3	8.5	6.5	7.0	5.0	2.0	1.5	.5	.5	.0	.0	1.0	.0
4	8.0	7.0	6.0	5.0	1.5	1.0	1.0	.0	.0	.0	.0	.0
5	9.0	7.0	7.0	6.0	1.0	1.0	.5	.0	.0	.0	.5	.0
6	9.0	8.5	7.0	5.5	1.0	.5	1.0	.5	.0	.0	.5	.0
7	8.5	8.0	5.5	4.5	1.0	.5	1.0	.5	.0	.0	1.0	.0
8	8.5	6.5	5.0	4.0	1.0	.5	.5	.0	.0	.0	.5	.0
9	8.5	6.5	4.0	3.0	.5	.0	.0	.0	.0	.0	1.5	.0
10	8.0	7.0	3.0	2.5	.5	.0	.0	.0	.0	.0	2.0	1.0
11	8.5	7.5	3.5	3.0	.5	.0	.0	.0	.0	.0	3.0	2.0
12	8.5	6.5	3.5	2.5	1.0	.5	.0	.0	.0	.0	3.0	1.5
13	8.0	6.0	3.0	2.5	1.5	1.0	.0	.0	.0	.0	2.5	2.5
14	8.0	7.0	3.0	2.5	1.5	1.5	.0	.0	.0	.0	3.5	1.5
15	8.0	8.0	3.0	2.5	1.5	1.0	.0	.0	.0	.0	3.5	2.0
16	8.0	6.5	3.0	2.5	1.0	.5	.0	.0	---	---	3.5	2.5
17	7.5	6.0	3.0	2.5	.5	.0	.0	.0	---	---	2.5	2.0
18	7.5	7.0	3.5	3.0	.0	.0	.0	.0	---	---	2.0	2.0
19	7.0	5.5	3.5	3.5	.0	.0	.0	.0	1.5	1.0	3.0	2.0
20	6.0	5.5	3.5	1.0	.0	.0	.0	.0	1.5	1.5	3.0	3.0
21	5.5	5.5	1.0	.5	.0	.0	.0	.0	2.0	1.5	3.0	2.5
22	5.5	5.0	1.0	1.0	1.0	.0	.0	.0	2.5	2.0	4.5	2.0
23	5.5	4.5	1.5	1.0	1.0	1.0	.0	.0	3.0	2.0	5.0	2.0
24	4.5	3.5	1.0	.5	1.0	.5	.0	.0	2.0	.5	4.5	3.5
25	4.5	4.0	1.0	.0	.5	.0	.0	.0	.5	.0	4.5	3.0
26	5.5	4.5	1.5	1.0	.5	.0	.0	.0	.5	.0	3.5	2.0
27	6.0	5.0	1.5	1.5	.5	.5	.0	.0	2.0	.0	3.5	1.0
28	6.0	5.5	1.5	1.5	.5	.5	.0	.0	2.0	1.0	4.0	1.0
29	6.0	5.5	1.5	1.0	1.5	1.0	.0	.0	---	---	4.5	2.5
30	7.0	6.0	1.0	1.0	1.5	1.0	.0	.0	---	---	4.5	3.5
31	7.5	6.5	---	---	1.0	.5	.0	.0	---	---	3.5	3.0
MONTH	9.0	3.5	8.5	.0	2.0	.0	1.0	.0			5.0	.0

04135700 SOUTH BRANCH AU SABLE RIVER NEAR LUZERNE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	3.5	2.5	13.5	11.5	18.0	15.5	17.5	14.0	17.5	15.0	13.5	12.5
2	3.0	2.5	13.5	11.5	16.5	14.0	18.0	14.0	17.5	16.0	14.0	13.0
3	2.5	2.0	13.5	11.0	16.0	13.0	17.5	15.0	16.5	15.0	14.0	13.0
4	2.0	2.0	13.5	11.5	16.5	12.0	19.5	15.5	17.0	15.5	15.0	12.0
5	2.0	1.5	13.0	12.5	16.5	12.5	19.5	15.5	18.0	15.5	14.0	12.0
6	3.0	1.5	15.0	12.5	17.0	13.0	20.5	17.5	19.5	15.5	14.0	13.0
7	3.0	2.0	15.0	14.0	17.0	14.5	21.0	18.5	20.5	16.5	13.5	11.0
8	3.5	1.5	15.0	12.0	19.0	14.5	21.0	17.0	20.0	17.5	13.5	10.5
9	4.0	2.0	14.5	12.0	19.0	15.5	19.5	16.0	19.0	15.5	15.0	11.5
10	4.0	3.0	15.5	13.0	17.5	16.0	20.5	17.0	15.5	13.5	14.5	12.5
11	3.0	3.0	17.0	13.5	18.0	13.0	20.0	16.5	14.5	11.5	16.5	13.5
12	3.5	2.5	18.5	15.5	17.5	14.0	19.5	15.0	16.0	12.0	17.0	14.5
13	4.0	3.5	18.5	16.5	17.5	14.5	18.5	15.0	16.5	12.5	17.5	15.5
14	5.5	4.0	18.0	16.0	18.0	14.0	18.0	16.0	16.0	13.5	17.5	15.0
15	7.0	5.0	18.0	16.5	18.0	15.0	19.5	16.0	17.5	14.5	15.0	12.5
16	6.5	5.5	18.0	16.0	15.0	14.0	21.0	17.5	18.0	14.5	12.5	11.5
17	5.5	5.5	18.0	16.0	15.0	13.0	21.0	18.5	18.5	15.0	11.5	10.0
18	6.5	5.0	19.5	15.5	13.5	13.0	20.0	18.0	18.0	14.5	11.5	10.0
19	7.0	6.0	19.0	17.0	15.5	12.0	20.5	17.0	18.0	15.5	11.0	9.0
20	7.0	6.5	18.5	16.5	15.5	12.5	20.5	17.0	19.0	16.0	11.0	10.5
21	6.5	5.0	18.0	14.5	15.0	13.5	20.5	16.5	18.0	15.0	10.5	10.0
22	7.0	5.5	16.5	13.0	16.0	13.5	20.0	17.5	16.0	14.5	10.5	9.5
23	9.5	7.0	13.0	12.5	16.0	14.0	20.5	17.0	16.5	13.5	11.5	9.0
24	11.5	9.5	14.0	12.0	16.0	13.5	20.5	17.0	15.5	13.5	11.0	10.5
25	13.0	11.0	17.0	12.5	16.0	15.0	20.0	17.5	16.0	13.0	10.5	10.5
26	13.0	11.0	17.5	14.0	17.5	13.0	19.5	18.0	16.5	13.5	11.5	10.5
27	11.0	10.0	17.5	15.5	17.0	14.0	18.5	16.0	16.5	14.5	12.0	11.5
28	11.5	9.5	17.0	15.5	18.5	15.0	18.0	14.5	14.5	11.5	12.5	11.5
29	12.0	10.0	18.0	16.0	18.5	16.0	18.0	14.0	13.0	10.5	13.5	12.0
30	12.5	10.5	18.0	16.0	18.0	14.0	18.0	15.5	13.0	10.5	14.5	12.5
31	---	---	18.0	15.5	---	---	17.5	15.5	13.0	11.0	---	---
MONTH	13.0	1.5	19.5	11.0	19.0	12.0	21.0	14.0	20.5	10.5	17.5	9.0

04136500 AU SABLE RIVER AT MIO, MI

LOCATION.--Lat 44°39'36", long 84°07'52", in NW¼ sec.7, T.26 N., R.3 E., Oscoda County, Hydrologic Unit 04070007, on right bank 150 ft (46 m) upstream from bridge on State Highway 33 in Mio, 500 ft (152 m) downstream from Mio hydroelectric plant, 9.5 mi (15.3 km) downstream from Big Creek, and 73.0 mi (117.5 km) upstream from mouth.

DRAINAGE AREA.--1,100 mi² (2,850 km²), approximately.

PERIOD OF RECORD.--July 1952 to current year.

GAGE.--Water-stage recorder. Datum of gage is 929.60 ft (283.342 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated at all stages by hydroelectric plant 500 ft (152 m) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--30 years, 982 ft³/s (27.81 m³/s), 12.12 in/yr (308 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,170 ft³/s (118 m³/s) Mar. 28, 1976, gage height, 6.14 ft (1.871 m); minimum, 7.0 ft³/s (0.20 m³/s) Aug. 4, 1977, gage height, -0.09 ft (-0.027 m); minimum daily, 21 ft³/s (0.59 m³/s) Aug. 9, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,530 ft³/s (71.6 m³/s) Apr. 17, gage height, 4.76 ft (1.451 m); minimum, 32 ft³/s (0.91 m³/s) Mar. 13, Aug. 11, 12, gage height, 0.27 ft (0.082 m); minimum daily, 609 ft³/s (17.2 m³/s) Jan. 10, 11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	771	755	868	800	746	746	1500	1150	953	798	816	765
2	804	750	855	692	694	739	1400	1140	1050	818	780	760
3	782	744	873	739	747	697	1360	1120	974	796	833	793
4	776	736	873	904	751	667	1540	1100	937	815	955	838
5	838	740	868	780	742	666	1450	1080	899	821	972	804
6	698	767	811	791	749	688	1270	1050	851	797	913	755
7	999	754	788	793	728	734	1230	1060	822	789	820	771
8	968	744	828	692	738	742	1210	1060	826	755	831	793
9	861	737	816	633	754	734	1180	1040	834	729	806	782
10	821	728	758	609	709	791	1200	1040	832	740	733	724
11	793	725	677	609	723	876	1230	1050	805	797	697	718
12	771	706	777	716	760	800	1190	1030	820	796	720	713
13	765	698	798	830	760	705	1210	1040	945	784	728	683
14	765	691	793	850	760	917	1380	1010	900	910	729	713
15	815	702	795	791	739	900	1450	999	859	1030	729	739
16	838	705	786	758	730	903	1650	999	928	985	740	771
17	838	716	739	675	733	912	2240	997	987	955	729	755
18	838	717	675	636	734	894	2490	981	950	1080	711	744
19	855	717	639	761	895	884	2190	987	968	1110	699	739
20	855	757	705	775	862	883	2260	986	979	985	821	760
21	861	777	794	885	821	878	2290	923	1040	851	798	793
22	861	730	839	735	760	886	1960	917	1080	851	760	771
23	838	721	825	733	805	885	1720	926	1010	822	782	739
24	776	720	773	756	771	910	1680	971	939	801	765	771
25	810	706	727	740	715	992	1540	974	920	797	787	884
26	815	711	712	750	675	1080	1550	948	868	769	793	999
27	798	904	814	747	762	989	1540	902	859	791	765	993
28	793	946	782	753	791	920	1360	913	871	852	729	926
29	765	902	755	752	---	919	1250	926	864	837	703	896
30	755	882	771	761	---	978	1180	907	818	810	724	890
31	734	---	776	780	---	1280	---	893	---	809	744	---
TOTAL	25257	22588	24290	23226	21154	26595	46700	31119	27388	26280	24112	23782
MEAN	815	753	784	749	756	858	1557	1004	913	848	778	793
MAX	999	946	873	904	895	1280	2490	1150	1080	1110	972	999
MIN	698	691	639	609	675	666	1180	893	805	729	697	683
CFSM	.74	.69	.71	.68	.69	.78	1.42	.91	.83	.77	.71	.72
IN.	.85	.76	.82	.79	.72	.90	1.58	1.05	.93	.89	.82	.80

CAL YR 1981 TOTAL 314650 MEAN 862 MAX 1840 MIN 686 CFSM .78 IN 10.64
WTR YR 1982 TOTAL 322491 MEAN 884 MAX 2490 MIN 609 CFSM .80 IN 10.91

04137500 AU SABLE RIVER NEAR AU SABLE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 44°26'09", long 83°26'28", in NE¼ NW¼ sec.35, T.24 N., R.8 E., Iosco County, Hydrologic Unit 04070007, 5.5 mi (8.8 km) northwest of Au Sable and 10.4 mi (16.7 km) upstream from mouth.

DRAINAGE AREA.--1,540 mi² (3,990 km²), approximately.

PERIOD OF RECORD.--Water years 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: April 1978 to September 1981.
WATER TEMPERATURES: April 1978 to September 1981.

REMARKS.--Bimonthly samples are collected as a cross-section sample at or near vicinity of bridge. Water-discharge measurements are made at times of sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 346 micromhos Nov. 21, 1978; minimum daily, 229 micromhos Apr. 19, 21, 1979.
WATER TEMPERATURES: Maximum daily, 26.0°C Aug. 12, 1980; minimum daily, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV												
19...	1230	2380	310	8.1	5.5	11.5	93	<1	<5	150	3.0	43
JAN												
19...	1200	1410	316	7.9	.0	12.1	94	<1	<7	160	10	46
MAR												
23...	1330	2430	325	7.5	1.0	11.0	79	<1	<1	160	14	46
MAY												
18...	1130	2370	240	8.2	17.0	8.8	92	<1	<6	120	6.0	34
JUL												
20...	1130	2340	296	8.3	23.0	7.6	88	<1	74	150	3.0	42
SEP												
21...	1120	1640	284	7.5	18.0	8.2	87	<1	--	150	9.0	41

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
NOV												
19...	11	5.0	7	.6	150	11	5.7	<.1	8.8	187	175	.25
JAN												
19...	11	4.4	6	.5	150	12	5.6	<.1	8.1	186	177	.25
MAR												
23...	12	4.8	6	.5	150	11	5.4	.1	9.7	181	180	.25
MAY												
18...	7.9	2.8	5	.6	110	10	4.3	<.1	6.0	151	132	.21
JUL												
20...	10	4.3	6	.1	140	10	4.8	.1	8.4	180	166	.24
SEP												
21...	11	4.4	6	.5	140	8.0	5.0	.2	9.7	167	163	.23

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV												
19...	1200	.16	.030	.04	.15	.060	.18	.050	<.010	2	13	100
JAN												
19...	708	.10	.010	.01	.29	<.010	--	<.010	<.010	3	11	100
MAR												
23...	1190	.09	.100	.13	.22	.010	.03	.010	<.010	4	26	100
MAY												
18...	966	<.10	.010	.01	.36	.020	.06	.010	<.010	8	51	100
JUL												
20...	1140	<.10	.020	.03	.40	.010	.03	<.010	<.010	8	51	100
SEP												
21...	739	<.10	.090	.12	.10	.020	.06	.010	.010	9	40	100

04137500 AU SABLE RIVER NEAR AU SABLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
NOV										
19...	1230	2	1	100	23	<1	2	10	<10	<1
MAR										
23...	1330	1	1	100	25	<1	<1	10	<10	1
MAY										
18...	1130	1	1	<100	21	<1	1	10	<10	1
SEP										
21...	1120	3	3	<100	28	--	2	10	10	3

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
NOV										
19...	<1	10	5	90	12	5	1	20	<1	<.1
MAR										
23...	<1	9	3	100	10	3	1	20	9	<.1
MAY										
18...	<1	8	5	100	<3	2	2	10	1	<.1
SEP										
21...	<1	7	5	130	8	8	6	50	5	<.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
NOV									
19...	<.1	2	1	<1	<1	<1	<1	40	<4
MAR									
23...	<.1	2	<1	<1	<1	<1	<1	20	<4
MAY									
18...	<.1	2	2	<1	<1	<1	<1	10	<3
SEP									
21...	<.1	2	2	<1	<1	<1	<1	270	21

STREAMS TRIBUTARY TO LAKE HURON

04140500 RIFLE RIVER AT SELKIRK, MI

LOCATION.--Lat 44°18'48", long 84°04'10", in SE¼ NE¼ sec.9, T.22 N., R.3 E., Ogemaw County, Hydrologic Unit 04080101, on left bank at upstream side of bridge on State Road at Selkirk, 1.0 mi (1.6 km) downstream from Klacking Creek.

DRAINAGE AREA.--117 mi² (303 km²).

PERIOD OF RECORD.--September 1950 to September 1982 (discontinued).

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 828.47 ft (252.518 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--32 years, 143 ft³/s (4.050 m³/s), 16.60 in/yr (422 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,760 ft³/s (78.2 m³/s) May 20, 1959, gage height, 6.76 ft (2.060 m); minimum, 52 ft³/s (1.47 m³/s) July 23, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 500 ft³/s (14.2 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Apr. 1	1800	*980	27.8	*3.92	1.195	Apr. 4	1600	749	21.2	3.42	1.042

Minimum discharge, 72 ft³/s (2.04 m³/s) Aug. 18, 19; gage height, 1.50 ft (0.457 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	109	104	146	105	110	107	920	140	261	108	96	107
2	110	103	173	108	110	106	722	135	246	102	97	120
3	104	100	172	110	110	105	640	131	165	96	98	112
4	101	99	152	112	110	106	658	127	135	95	105	103
5	102	100	139	115	108	108	528	125	123	94	96	96
6	110	105	129	115	108	108	340	130	114	94	93	99
7	119	104	127	115	108	108	275	132	110	91	89	94
8	106	102	130	115	105	110	257	138	110	86	92	89
9	101	102	125	115	105	110	268	129	105	85	90	86
10	98	101	125	115	105	110	282	127	109	86	87	84
11	102	103	125	115	105	111	254	126	102	104	83	82
12	99	102	119	115	105	112	238	127	99	103	82	85
13	95	100	110	115	105	100	296	123	117	92	80	83
14	97	100	110	115	105	102	321	118	109	90	79	93
15	137	101	109	115	105	105	306	119	119	101	80	131
16	134	101	106	115	105	198	317	115	162	95	78	108
17	121	102	105	115	105	211	388	113	131	94	76	100
18	152	103	105	115	105	205	372	110	129	139	73	106
19	148	108	105	115	105	200	296	110	208	161	74	97
20	126	129	105	115	105	204	344	116	214	121	100	94
21	117	134	105	115	105	210	352	109	396	107	98	94
22	113	126	105	115	105	216	257	103	379	98	91	94
23	111	120	109	115	108	240	223	132	272	94	96	96
24	109	117	110	112	108	320	205	166	201	89	92	108
25	107	112	110	110	108	415	193	143	172	86	106	151
26	106	123	110	110	108	390	178	127	158	85	98	145
27	106	245	110	110	108	310	178	124	140	87	88	131
28	104	231	108	110	108	280	165	159	131	99	82	122
29	104	177	106	110	---	290	153	138	122	88	81	110
30	104	151	104	110	---	330	148	129	117	93	92	105
31	103	---	104	110	---	600	---	150	---	112	90	---
TOTAL	3455	3605	3698	3502	2987	6497	10074	3971	4956	3075	2762	3125
MEAN	111	120	119	113	107	210	336	128	165	99.2	89.1	104
MAX	152	245	173	115	110	600	920	166	396	161	106	151
MIN	95	99	104	105	105	105	148	103	99	85	73	82
CFSM	.95	1.03	1.02	.97	.92	1.80	2.87	1.09	1.41	.85	.76	.89
IN.	1.10	1.15	1.18	1.11	.95	2.07	3.20	1.26	1.58	.98	.88	.99

CAL YR 1981 TOTAL 50653 MEAN 139 MAX 643 MIN 69 CFSM 1.19 IN 16.10
WTR YR 1982 TOTAL 51707 MEAN 142 MAX 920 MIN 73 CFSM 1.21 IN 16.44

04142000 RIFLE RIVER NEAR STERLING, MI
(National stream-quality accounting network station)

LOCATION.--Lat 44°04'21", long 84°01'12", in NE¼ SW¼ sec.5, T.19 N., R.4 E., Arenac County, Hydrologic Unit 04080101, on left bank 30 ft (9 m) downstream from bridge on Old M-70, 2.8 mi (4.5 km) north of Sterling, and 20 mi (32 km) upstream from mouth.

DRAINAGE AREA.--320 mi² (830 km²), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--November 1905 to December 1908 (gage heights and discharge measurements only), October 1936 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as Rifle River at Michigan Highway 70 near Sterling 1936-61.

REVISED RECORDS.--WSP 1437: 1937(M), 1939-40(M).

GAGE.--Water-stage recorder. Datum of gage is 649.48 ft (197.962 m) National Geodetic Vertical Datum of 1929. November 1905 to December 1908, nonrecording gage at site 400 ft (122 m) downstream at different datum. Jan. 13, 1937, to Jan. 10, 1939, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Occasional regulation by dams above station.

AVERAGE DISCHARGE.--46 years, 307 ft³/s (8.694 m³/s), 13.03 in/yr (331 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,340 ft³/s (151 m³/s) Mar. 28, 1950, gage height, 13.74 ft (4.188 m), from rating curve extended above 3,800 ft³/s (108 m³/s); minimum, 75 ft³/s (2.12 m³/s) Nov. 22, 1964, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,310 ft³/s (65.4 m³/s) Apr. 1, gage height, 8.03 ft (2.448 m); only peak above base of 1,600 ft³/s (45.3 m³/s); minimum discharge, 131 ft³/s (3.71 m³/s) Dec. 17, result of freezeup; minimum gage height, 1.39 ft (0.424 m) Aug. 19.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	246	215	382	205	210	210	2260	286	730	250	207	204
2	271	214	451	205	210	210	2030	274	888	239	193	303
3	248	212	472	200	210	210	1780	264	592	223	193	250
4	265	208	417	200	210	210	1760	257	426	230	206	210
5	241	206	367	200	210	210	1340	255	319	228	210	188
6	260	211	331	200	210	210	1010	262	296	218	191	182
7	279	233	311	200	210	210	753	276	288	206	181	179
8	247	248	310	205	210	210	678	284	277	189	178	169
9	206	244	288	205	210	210	669	270	262	199	173	163
10	196	228	270	205	210	210	681	258	260	199	162	159
11	195	219	260	205	210	220	634	253	244	228	157	156
12	210	214	250	205	210	250	581	249	226	224	155	156
13	224	206	240	205	210	290	643	248	235	198	151	157
14	212	205	230	205	210	350	738	237	242	185	148	202
15	258	215	220	205	210	355	689	229	278	206	148	343
16	303	212	220	205	210	360	682	226	397	201	148	287
17	267	204	215	205	210	360	806	223	334	184	147	230
18	314	201	210	205	210	360	812	226	303	256	143	227
19	352	202	210	210	210	360	650	255	603	363	140	212
20	301	255	210	210	210	360	693	274	638	281	151	197
21	268	285	210	210	210	380	754	243	954	234	177	192
22	251	270	210	210	210	500	588	219	1000	206	166	191
23	241	254	210	210	210	706	486	359	794	193	171	191
24	233	242	210	210	210	945	436	517	588	183	173	197
25	260	231	210	210	210	1200	404	459	486	180	194	356
26	280	261	205	210	210	1100	381	366	448	184	200	463
27	253	614	205	210	210	874	370	342	367	182	175	350
28	241	693	205	210	210	796	345	469	323	205	160	285
29	232	508	205	210	---	810	316	436	281	186	156	250
30	229	416	205	210	---	1060	301	465	266	175	179	227
31	220	---	205	210	---	1960	---	430	---	226	184	---
TOTAL	7803	8146	8144	6395	5880	15716	24270	9411	13345	6653	5317	6890
MEAN	252	272	263	206	210	507	809	304	445	215	172	230
MAX	352	693	472	210	210	1960	2260	517	1000	363	210	463
MIN	195	201	205	200	210	210	301	219	226	175	140	156
CFSM	.79	.85	.82	.64	.66	1.58	2.53	.95	1.39	.67	.54	.72
IN.	.91	.95	.95	.74	.68	1.83	2.82	1.09	1.55	.77	.62	.80

CAL YR 1981 TOTAL 110534 MEAN 303 MAX 1480 MIN 134 CFSM .95 IN 12.85
WTR YR 1982 TOTAL 117978 MEAN 323 MAX 2260 MIN 140 CFSM 1.01 IN 13.71

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1966-72, 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to September 1981.
WATER TEMPERATURES: November 1974 to September 1981.
SUSPENDED-SEDIMENT DISCHARGE: Water year 1970.

INSTRUMENTATION.--Water-quality monitor August 1975 to September 1981.

REMARKS.--Bimonthly samples are collected as a cross-section sample at or near vicinity of bridge. Water-discharge measurements are made at times of sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded, 567 micromhos Sept. 6, 1978; minimum, 157 micromhos Aug. 31, 1975.
WATER TEMPERATURES: Maximum, 30.5°C July 20, 1977; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT												
07...	1130	270	328	8.0	9.5	10.9	97	K36	770	200	24	57
DEC												
17...	1045	132	458	8.2	.5	12.9	90	K2	85	220	33	63
FEB												
04...	1100	285	446	7.8	.0	13.8	94	K16	K13	220	26	60
MAR												
18...	1100	355	427	7.9	.5	11.8	82	470	K4900	190	33	54
JUN												
10...	1130	267	411	8.3	18.0	9.6	105	120	990	200	21	56
AUG												
19...	1030	142	414	7.8	19.5	8.8	97	93	49	210	29	57

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
OCT												
07...	15	11	10	1.4	180	27	16	.1	7.7	258	244	.35
DEC												
17...	16	10	9	1.2	190	32	14	.1	8.2	289	259	.39
FEB												
04...	16	9.8	9	.9	190	31	12	.1	10	268	254	.36
MAR												
18...	14	12	12	2.3	160	28	19	.1	8.3	240	234	.33
JUN												
10...	14	9.0	9	1.1	180	30	15	.1	6.7	276	238	.38
AUG												
19...	16	10	9	.5	180	27	13	.2	7.1	257	239	.35

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT												
07...	188	.13	.030	.04	.71	.020	.06	<.010	--	12	8.7	100
DEC												
17...	103	.47	.050	.06	.16	.010	.03	<.010	<.010	7	2.5	100
FEB												
04...	148	.26	.090	.12	.46	.040	.12	.020	.020	14	7.7	100
MAR												
18...	230	.55	.210	.27	2.00	.100	.31	.060	.030	46	44	100
JUN												
10...	199	.17	<.010	.01	1.50	.030	.09	<.010	<.010	22	16	100
AUG												
19...	98.5	<.10	.020	.03	.40	.020	.06	<.010	<.010	13	5.0	100

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
DEC										
17...	1045	2	1	100	49	<1	<1	10	<10	<1
MAR										
18...	1100	3	1	100	50	1	<1	10	<10	1
JUN										
10...	1130	4	3	100	53	<1	<1	10	<10	4
AUG										
19...	1030	5	4	100	56	1	1	10	10	2

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
DEC										
17...	<1	--	4	260	44	1	1	30	21	<.1
MAR										
18...	<1	15	3	1200	110	3	3	110	37	.1
JUN										
10...	<1	19	1	640	51	4	3	60	11	.2
AUG										
19...	1	7	2	210	18	3	1	20	10	<.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
DEC									
17...	<.1	<1	<1	<1	<1	<1	<1	90	19
MAR									
18...	<.1	4	<1	<1	<1	<1	<1	30	<4
JUN									
10...	<.1	31	3	<1	<1	<1	<1	20	14
AUG									
19...	<.1	5	2	<1	<1	<1	<1	20	<4

04143500 NORTH BRANCH KAWKAWLIN RIVER NEAR KAWKAWLIN, MI

LOCATION.--Lat 43°40'05", long 83°58'13", in SE¼ SE¼ sec.27, T.15 N., R.4 E., Bay County, Hydrologic Unit 04080102, on left bank 50 ft (15 m) upstream from bridge on Beaver Road, 1.7 mi (2.7 km) northwest of Kawkawlin, and 2.4 mi (3.9 km) upstream from mouth.

DRAINAGE AREA.--101 mi² (262 km²).

PERIOD OF RECORD.--March 1951 to September 1982 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 584.00 ft (178.003 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Sept. 26, 1951, nonrecording gage at site 70 ft (21 m) downstream, and Sept. 27, 1951, to Sept. 30, 1960, water-stage recorder at present site, at datum 2.00 ft (0.610 m) higher.

REMARKS.--Records fair except those for the winter period, which are poor. Some diversion above station for irrigation. Some regulation during low flows by dams above station. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--31 years, 59.6 ft³/s (1.688 m³/s), 8.01 in/yr (203 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,610 ft³/s (45.6 m³/s) May 18, 1974, gage height, 10.92 ft (3.328 m); no flow at times in each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 957 ft³/s (27.1 m³/s) Mar. 26, gage height, 9.27 ft (2.825 m); maximum gage height, 9.41 ft (2.868 m) Mar. 18, backwater from ice; no flow Sept. 9-14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	328	34	356	14	15	24	630	36	256	94	2.7	.87
2	315	31	266	15	15	26	736	31	270	72	2.2	2.9
3	269	30	199	15	15	26	622	27	281	55	2.2	3.0
4	289	27	164	24	15	27	505	23	328	44	4.6	1.7
5	335	26	152	30	15	28	427	19	288	36	3.7	.88
6	333	24	142	31	15	29	381	19	203	30	3.0	.30
7	282	23	125	33	15	30	300	18	142	23	2.5	.06
8	210	21	111	38	15	30	236	17	92	18	17	.03
9	169	20	99	42	15	31	191	17	61	15	13	.00
10	175	19	100	42	15	32	167	19	44	14	8.3	.00
11	187	19	74	39	15	35	158	19	30	17	6.8	.00
12	163	19	61	35	15	45	152	17	23	13	5.6	.00
13	131	18	59	32	15	150	149	17	18	11	4.8	.00
14	100	18	52	30	15	160	140	15	14	8.6	4.2	.00
15	76	17	52	28	15	170	127	13	22	7.9	3.6	.04
16	58	17	38	24	15	190	120	11	98	7.1	3.2	.05
17	46	16	42	23	15	220	120	8.2	136	6.6	2.7	.04
18	42	15	37	21	15	260	110	7.4	270	6.5	2.3	.10
19	37	15	28	20	15	430	105	7.5	375	6.3	1.8	.11
20	35	21	22	19	15	500	112	6.8	363	5.3	1.4	.05
21	46	34	22	18	16	560	109	5.7	354	4.2	1.2	.02
22	74	32	21	17	17	600	95	5.7	446	3.5	.88	.06
23	97	36	19	17	18	625	99	8.8	524	3.2	.61	.06
24	94	40	16	17	19	676	113	14	538	2.9	.22	.06
25	80	52	15	16	20	866	99	13	431	27	1.1	.06
26	67	64	15	16	21	923	80	11	318	13	.82	.06
27	60	138	14	16	22	855	65	17	216	8.3	.24	.06
28	54	142	14	15	23	666	52	60	167	9.2	.07	.06
29	47	334	14	15	---	496	45	68	139	6.2	.05	.06
30	42	433	14	15	---	441	41	81	119	4.2	.06	.05
31	38	---	14	15	---	526	---	150	---	3.1	.06	---
TOTAL	4279	1735	2357	732	456	9667	6286	782.1	6558	575.1	100.91	10.68
MEAN	138	57.8	76.0	23.6	16.3	312	210	25.2	219	18.6	3.26	.36
MAX	335	433	356	42	23	923	736	150	538	94	17	3.0
MIN	35	15	14	14	15	24	41	5.7	14	2.9	.05	.00
CFSM	1.37	.57	.75	.23	.16	3.09	2.08	.25	2.17	.18	.03	.004
IN.	1.58	.64	.87	.27	.17	3.56	2.32	.29	2.42	.21	.04	.00

CAL YR 1981 TOTAL 33534.78 MEAN 91.9 MAX 961 MIN .00 CFSM .91 IN 12.35
WTR YR 1982 TOTAL 33538.79 MEAN 91.9 MAX 923 MIN .00 CFSM .91 IN 12.35

04143900 SHIAWASSEE RIVER AT LINDEN, MI

LOCATION.--Lat 42°48'56", long 83°48'08", in SW¼ sec.19, T.5 N., R.6 E., Genesee County, Hydrologic Unit 04080203, on right bank at upstream side of bridge on Hogan Road, 1.0 mi (1.6 km) west of Linden.

DRAINAGE AREA.--81.2 mi² (210.3 km²).

PERIOD OF RECORD.--October 1967 to current year.

GAGE.--Water-stage recorder. Datum of gage is 844.96 ft (257.544 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are poor. Flow regulated by dam at Linden since 1967. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--15 years, 60.5 ft³/s (1.713 m³/s), 10.12 in/yr (257 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 476 ft³/s (13.5 m³/s) Apr. 22, 1975, gage height, 7.43 ft (2.265 m); minimum, 0.74 ft³/s (0.021 m³/s) May 22, 23, 1971; minimum gage height, 2.82 ft (0.860 m) Aug. 2, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 320 ft³/s (9.06 m³/s) Oct. 6, gage height, 6.75 ft (2.057 m); minimum, 17 ft³/s (0.48 m³/s) Sept. 13, 14, minimum gage height, 3.51 ft (1.070 m) Aug. 19.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	212	92	86	42	32	50	203	77	73	43	48	20
2	240	92	88	43	32	49	186	75	97	43	48	20
3	222	92	92	45	32	48	204	74	141	45	46	19
4	232	89	92	46	32	48	222	72	177	46	39	19
5	273	87	90	51	32	47	220	64	189	46	39	19
6	298	88	86	53	32	47	226	47	220	45	38	19
7	297	86	82	52	32	47	218	39	206	45	37	19
8	234	83	82	50	32	47	206	36	202	44	36	19
9	262	82	79	49	32	49	193	35	176	43	33	19
10	216	82	78	48	32	50	184	36	132	44	24	18
11	201	80	73	50	32	55	182	40	139	47	20	18
12	189	79	69	57	32	68	175	43	134	44	20	18
13	159	76	66	55	32	110	164	48	111	43	20	18
14	138	74	66	53	33	148	154	49	106	40	20	18
15	142	72	66	50	34	168	157	50	102	35	20	19
16	133	68	66	48	35	193	156	49	104	35	20	19
17	109	64	66	45	36	225	147	47	94	39	19	18
18	113	61	65	43	37	228	153	47	82	40	19	20
19	113	60	64	41	38	245	151	47	82	41	19	19
20	110	64	64	39	38	252	146	45	86	43	19	19
21	106	67	64	38	38	252	137	43	87	43	20	19
22	98	71	64	37	40	248	133	42	80	43	19	21
23	90	71	54	37	51	243	131	43	73	43	19	31
24	85	69	49	36	59	237	117	42	60	42	19	31
25	81	65	47	35	78	231	115	40	53	41	21	27
26	79	65	40	34	80	222	112	39	49	42	20	27
27	82	74	38	33	75	210	98	40	48	43	20	36
28	88	73	38	33	55	188	86	41	46	55	20	50
29	94	76	40	33	---	189	82	44	43	55	20	47
30	95	78	41	32	---	189	78	45	43	53	20	48
31	93	---	44	32	---	197	---	46	---	52	20	---
TOTAL	4884	2280	2031	1340	1153	4580	4736	1485	3235	1363	802	714
MEAN	158	76.0	65.5	43.2	41.2	148	158	47.9	108	44.0	25.9	23.8
MAX	298	92	92	57	80	252	226	77	220	55	48	50
MIN	79	60	38	32	32	47	78	35	43	35	19	18
CFSM	1.95	.94	.81	.53	.51	1.82	1.95	.59	1.33	.54	.32	.29
IN.	2.24	1.04	.93	.61	.53	2.10	2.17	.68	1.48	.62	.37	.33

CAL YR 1981 TOTAL 23695.7 MEAN 64.9 MAX 298 MIN 8.6 CFSM .80 IN 10.86
WTR YR 1982 TOTAL 28603.0 MEAN 78.4 MAX 298 MIN 18 CFSM .97 IN 13.10

04144000 SHIAWASSEE RIVER AT BYRON, MI

LOCATION.--Lat 42°49'25", long 83°56'45", in NE¼ NE¼ sec.23, T.5 N., R.4 E., Shiawassee County, Hydrologic Unit 04080203, on left bank at upstream side of highway bridge at Byron, 0.3 mi (0.5 km) downstream from milldams which are just upstream from South Branch Shiawassee River.

DRAINAGE AREA.--368 mi² (953 km²).

PERIOD OF RECORD.--October 1947 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1144: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 812.00 ft (247.498 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 17, 1960, nonrecording gage and crest-stage gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Low flow slightly regulated at times by mills above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 252 ft³/s (7.137 m³/s), 9.30 in/yr (236 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,880 ft³/s (110 m³/s) Apr. 22, 1975, gage height, 15.25 ft (4.648 m); minimum, 19 ft³/s (0.54 m³/s), Aug. 16, 1965; minimum gage height, 3.55 ft (1.082 m) Sept. 16, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,240 ft³/s (63.4 m³/s) Oct. 4, gage height 12.05 ft (3.673 m); minimum, 33 ft³/s (0.93 m³/s) Aug. 23, 24, gage height, 4.05 ft (1.234 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1020	391	464	184	130	225	900	227	363	195	199	66
2	1370	372	430	159	130	220	1000	217	488	182	190	65
3	1900	359	393	183	130	215	1100	210	778	184	188	66
4	2190	346	356	205	130	210	1100	208	988	191	188	63
5	2220	352	339	231	135	210	1050	202	986	200	175	60
6	2140	376	326	253	135	210	1000	196	852	196	150	59
7	1930	377	316	258	135	210	950	196	672	185	136	60
8	1690	370	312	195	135	210	859	219	551	164	130	61
9	1430	356	260	190	120	220	788	248	492	147	123	60
10	1230	312	243	180	120	240	734	242	407	145	118	60
11	1070	257	203	180	120	330	670	258	346	152	112	60
12	926	235	244	180	120	403	669	270	289	150	106	54
13	731	198	216	175	120	912	693	268	258	156	101	53
14	580	208	207	170	130	1130	692	268	195	167	98	63
15	521	211	208	170	140	1520	672	262	212	174	93	91
16	474	209	205	165	145	1900	640	218	244	180	90	91
17	452	209	203	165	150	2060	602	184	223	178	90	86
18	441	209	173	160	155	2060	564	159	211	195	89	115
19	432	225	184	160	160	2010	567	149	217	209	83	121
20	401	273	204	155	170	1880	580	142	261	167	81	123
21	399	318	185	155	190	1740	571	140	313	150	81	120
22	399	343	221	150	210	1590	503	139	323	143	74	122
23	401	341	243	150	240	1420	415	142	282	141	50	130
24	405	327	252	145	250	1300	385	144	215	140	43	134
25	392	312	248	145	250	1200	365	129	187	134	76	141
26	370	305	235	140	240	1100	352	137	177	132	88	144
27	362	363	224	140	235	1000	319	144	165	141	70	146
28	378	404	222	140	230	900	284	171	162	184	66	165
29	400	455	224	135	---	800	235	227	174	222	62	173
30	418	451	201	135	---	750	227	205	186	222	63	166
31	411	---	186	130	---	800	---	196	---	209	64	---
TOTAL	27483	9464	7927	5283	4555	29065	19486	6117	11217	5335	3277	2918
MEAN	887	315	256	170	163	938	650	197	374	172	106	97.3
MAX	2220	455	464	258	250	2060	1100	270	988	222	199	173
MIN	362	198	173	130	120	210	227	129	162	132	43	53
CFSM	2.41	.86	.70	.46	.44	2.55	1.77	.54	1.02	.47	.29	.26
IN.	2.78	.96	.80	.53	.46	2.94	1.97	.62	1.13	.54	.33	.29

CAL YR 1981 TOTAL 113544 MEAN 311 MAX 2220 MIN 37 CFSM .85 IN 11.48
WTR YR 1982 TOTAL 132127 MEAN 362 MAX 2220 MIN 43 CFSM .98 IN 13.36

04144500 SHIAWASSEE RIVER AT OWOSSO, MI

LOCATION.--Lat 43°00'54", long 84°10'52", in SW¼ sec.12, T.7 N., R.2 E., Shiawassee County, Hydrologic Unit 04080203, on right bank on grounds of sewage-treatment plant, 1.5 mi (2.4 km) north of Owosso.

DRAINAGE AREA.--538 mi² (1,393 km²).

PERIOD OF RECORD.--March 1931 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height record for flood seasons collected in this vicinity 1904, 1910-30 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1307: 1949(M). WSP 1337: 1932, 1934, 1936-38, 1944.

GAGE.--Water-stage recorder. Datum of gage is 707.25 ft (215.570 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 15, 1933, at site 1.5 mi (2.4 km) upstream at datum 5.46 ft (1.664 m) higher.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated below about 800 ft³/s (22.7 m³/s) by power-plant at Shiawassee town prior to February 1953; occasional regulation at low stages since. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--51 years, 331 ft³/s (9.374 m³/s), 8.35 in/yr (212 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,240 ft³/s (177 m³/s) Apr. 6, 1947, gage height, 10.35 ft (3.155 m); minimum, 0.2 ft³/s (0.006 m³/s) July 27, 1934, gage height, 1.12 ft (0.341 m); minimum daily, 2.0 ft³/s (0.057 m³/s) July 28, 1934.

EXTREMES FOR CURRENT YEAR.--Peak discharge above base of 1,500 ft³/s (42.5 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	1300	*5,460	155	*10.25	3.124	Mar. 31	2100	1,690	47.9	5.61	1.710
Mar. 13	1900	4,100	116	8.55	2.606						

Minimum discharge, 59 ft³/s (1.67 m³/s) Sept. 13; minimum gage height, 2.18 ft (0.664 m) Sept. 13, 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4710	540	600	273	190	335	1560	317	524	208	249	70
2	4100	516	624	277	190	330	1490	311	775	211	246	72
3	3380	488	580	234	185	325	1620	301	728	203	220	70
4	3110	472	528	376	180	320	1670	311	924	197	217	68
5	3050	472	480	528	180	320	1570	308	1060	197	214	68
6	2830	488	452	504	175	320	1410	298	1030	203	200	70
7	2740	496	433	472	170	320	1290	292	918	203	175	68
8	2410	492	426	418	170	320	1190	295	712	192	161	66
9	2060	472	411	317	170	330	1140	314	596	172	145	66
10	1720	449	323	286	170	350	1150	339	544	153	135	66
11	1490	411	298	270	170	460	1100	336	464	148	125	64
12	1280	362	320	265	170	700	1100	346	386	156	118	64
13	1110	336	333	260	170	3000	1220	366	330	150	110	61
14	888	298	298	250	180	3500	1240	359	301	150	103	72
15	760	298	283	250	190	3090	1100	349	249	203	96	76
16	676	304	283	245	200	3120	984	336	261	217	94	94
17	604	295	277	240	210	3460	978	292	304	270	89	108
18	596	292	222	235	220	3310	924	246	292	280	85	135
19	584	295	214	235	240	3010	830	222	323	255	83	125
20	560	383	252	230	260	2790	800	194	314	255	89	137
21	528	524	286	220	280	2580	785	180	366	203	78	137
22	576	528	255	220	300	2360	750	178	408	172	76	137
23	568	516	304	215	320	2150	676	178	390	158	76	140
24	552	488	320	210	345	1940	568	178	352	148	72	145
25	532	456	317	210	365	1730	536	175	298	137	94	153
26	508	445	326	210	355	1580	504	167	267	167	78	153
27	496	544	326	205	345	1460	492	156	243	148	89	255
28	560	604	308	205	340	1310	460	167	231	186	81	217
29	576	604	317	200	---	1150	426	252	231	289	72	206
30	572	620	314	195	---	1070	336	323	220	298	74	206
31	568	---	277	195	---	1560	---	289	---	280	72	---
TOTAL	44694	13688	10987	8450	6440	48600	29899	8375	14041	6209	3816	3369
MEAN	1442	450	354	273	230	1568	997	270	468	200	123	112
MAX	4710	620	624	528	365	3500	1670	366	1060	298	249	255
MIN	496	292	214	195	170	320	336	156	220	137	72	61
CFSM	2.68	.84	.66	.51	.43	2.91	1.85	.50	.87	.37	.23	.21
IN.	3.09	.93	.76	.58	.45	3.36	2.07	.58	.97	.43	.26	.23

CAL YR 1981 TOTAL 174385 MEAN 478 MAX 4710 MIN 45 CFSM .89 IN 12.06
WTR YR 1982 TOTAL 198368 MEAN 543 MAX 4710 MIN 61 CFSM 1.01 IN 13.72

04145000 SHIAWASSEE RIVER NEAR FERGUS, MI

LOCATION.--Lat 43°15'17", long 84°06'20", in sec.22, T.10 N., R.3 E., Saginaw County, Hydrologic Unit 04080203, on right bank at downstream side of county highway bridge, 1.2 mi (1.9 km) east of Fergus, 1.8 mi (2.9 km) upstream from Bear Creek, and 14 mi (22 km) above mouth.

DRAINAGE AREA.--637 mi² (1,650 km²).

PERIOD OF RECORD.--October 1939 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1337: 1940(M), 1941-42, 1943(M), 1944, 1945(M), 1946, 1947(M), 1948, 1950. WSP 1627: 1952, 1954(M), 1957.

GAGE.--Water-stage recorder. Datum of gage is 585.80 ft (178.552 m) National Geodetic Vertical Datum of 1929. Prior to Aug. 22, 1968, nonrecording gage at same site and datum. Prior to Oct. 1, 1970, at datum 2.00 ft (0.610 m) higher.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Jan. 10 to Mar. 16, which are fair. Some regulation at low stages by powerplant above Owosso prior to February 1953; occasional regulation at low stages since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--43 years, 419 ft³/s (11.87 m³/s), 8.93 in/yr (227 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,500 ft³/s (212 m³/s) Apr. 6, 1947 (includes overflow bypassing gage); maximum gage height, 15.44 ft (4.706 m), present datum, Mar. 29, 1960; minimum discharge, 27 ft³/s (0.76 m³/s) Aug. 8, 1966; minimum gage height, 1.50 ft (0.457 m) Sept. 13, 1982.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 7,340 ft³/s (208 m³/s) Oct. 2, gage height, 14.84 ft (4.523 m); minimum, 75 ft³/s (2.12 m³/s) Sept. 13, gage height, 1.50 ft (0.457 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4120	702	650	325	220	395	2140	367	448	265	265	87
2	6900	664	639	310	215	390	1780	365	864	259	274	87
3	5440	629	653	295	210	385	1840	352	843	259	252	88
4	4260	597	594	350	210	380	1930	334	908	246	224	85
5	3820	571	532	500	205	375	1830	320	1120	236	218	81
6	3580	583	490	620	205	370	1680	310	1140	238	205	85
7	3360	587	469	550	200	370	1480	306	1040	240	189	84
8	3130	583	460	470	200	375	1410	315	876	232	172	82
9	2680	565	442	390	200	380	1340	310	730	216	159	79
10	2260	544	433	350	195	400	1370	332	671	189	145	79
11	1920	526	400	330	195	600	1360	344	571	184	135	79
12	1680	463	390	320	195	1000	1360	339	478	185	129	78
13	1480	391	370	310	200	3500	1520	365	412	185	123	77
14	1300	376	350	300	205	4000	1510	373	354	177	117	81
15	1100	313	340	290	210	3650	1300	357	330	179	111	96
16	968	327	330	280	225	3800	1200	349	289	250	106	99
17	904	310	320	280	245	4050	1140	337	349	281	104	106
18	846	303	310	270	260	4020	1120	281	344	313	99	139
19	835	298	300	270	280	3630	996	261	394	283	94	145
20	800	347	300	260	300	3320	948	230	409	276	105	142
21	769	496	300	260	320	3100	924	210	424	259	106	150
22	765	571	320	250	340	2850	884	208	502	203	92	153
23	807	559	340	250	360	2570	811	220	469	179	92	163
24	776	541	360	245	390	2360	716	218	424	166	90	159
25	748	508	370	240	430	2120	618	210	349	156	131	177
26	720	487	370	240	420	1890	590	210	294	156	125	184
27	688	583	370	235	415	1730	565	198	263	236	103	212
28	685	657	370	235	400	1570	523	207	244	242	101	344
29	751	653	360	230	---	1390	475	228	391	259	99	261
30	730	646	350	230	---	1290	433	360	301	315	95	238
31	730	---	340	220	---	2690	---	365	---	298	94	---
TOTAL	59552	15380	12622	9705	7450	58950	35793	9181	16231	7162	4354	3920
MEAN	1921	513	407	313	266	1902	1193	296	541	231	140	131
MAX	6900	702	653	620	430	4050	2140	373	1140	315	274	344
MIN	685	298	300	220	195	370	433	198	244	156	90	77
CFSM	3.02	.81	.64	.49	.42	2.99	1.87	.47	.85	.36	.22	.21
IN.	3.48	.90	.74	.57	.44	3.44	2.09	.54	.95	.42	.25	.23

CAL YR 1981 TOTAL 213262 MEAN 584 MAX 6900 MIN 72 CFSM .92 IN 12.45
WTR YR 1982 TOTAL 240300 MEAN 658 MAX 6900 MIN 77 CFSM 1.03 IN 14.03

04146000 FARMERS CREEK NEAR LAPEER, MI

LOCATION.--Lat 43°02'41", long 83°20'14", in sec.6, T.7 N., R.10 E., Lapeer County, Hydrologic Unit 04080204, on left bank at sewage-treatment plant at Michigan Home and Training School, 2.0 mi (3.2 km) west of Lapeer.

DRAINAGE AREA.--55.3 mi² (143.2 km²).

PERIOD OF RECORD.--October 1932 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 924: 1940. WSP 1084: 1942(M), 1943. WSP 1337: 1934-38, 1940(M), 1944(M), 1945, 1946(M), 1948-51(M). WSP 1727: 1952(M). WDR MI-78: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 805.79 ft (245.605 m) National Geodetic Vertical Datum of 1929. Prior to May 25, 1954, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Prior to 1941, occasional regulation by dam above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--50 years, 30.3 ft³/s (0.858 m³/s), 7.44 in/yr (189 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,280 ft³/s (36.2 m³/s) Apr. 6, 1947, gage height, 19.87 ft (6.056 m), from flood-mark, from rating curve extended above 660 ft³/s (18.7 m³/s) on basis of contracted-opening measurement of peak flow; minimum not determined.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 160 ft³/s (4.53 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 4	0200	371	10.5	17.72	5.401	Apr. 2	1800	254	7.19	17.13	5.221
Mar. 15	2000	*476	13.5	*17.99	5.483	June 3	2300	225	6.37	17.01	5.185

Minimum discharge, 1.9 ft³/s (0.054 m³/s) Aug. 22, gage height, 15.04 ft (4.584 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	113	96	80	26	16	27	158	32	59	44	10	10
2	148	97	74	20	16	27	243	25	95	45	10	10
3	332	84	68	29	16	21	234	13	191	40	10	9.3
4	335	71	61	36	16	20	187	11	206	32	10	9.0
5	278	62	55	37	16	20	154	10	158	35	9.6	8.6
6	196	56	51	41	16	20	125	11	117	41	9.3	8.2
7	146	50	48	31	16	20	129	14	90	40	8.6	7.6
8	129	49	46	30	16	21	109	22	69	34	9.0	7.2
9	118	46	43	29	16	25	96	22	56	28	8.2	6.8
10	104	46	40	26	16	30	90	16	46	22	7.9	6.5
11	90	42	37	25	17	40	90	14	38	22	7.6	5.9
12	73	41	36	23	17	50	91	14	33	21	6.8	5.9
13	61	38	34	22	17	70	95	10	28	19	6.2	5.6
14	51	36	33	21	17	140	97	6.5	22	18	5.9	5.3
15	46	34	31	20	17	413	100	5.6	18	17	5.6	5.6
16	40	33	29	19	18	445	100	6.8	19	15	4.7	5.6
17	39	32	26	19	18	379	99	6.2	22	17	4.4	5.9
18	36	32	22	18	19	335	91	6.2	23	19	4.4	9.3
19	35	32	27	18	20	324	87	6.5	28	23	3.5	13
20	36	36	26	18	20	281	83	6.8	32	26	2.5	15
21	35	38	25	18	21	249	77	6.8	38	26	2.1	14
22	37	42	25	18	22	217	69	7.6	40	22	2.1	13
23	36	47	25	17	23	193	62	7.6	40	19	2.1	14
24	37	50	26	17	22	175	57	8.6	38	17	2.1	14
25	38	49	26	17	21	157	53	10	34	14	6.5	14
26	39	48	26	17	23	147	48	10	31	13	9.0	13
27	66	50	25	17	25	141	44	11	26	12	10	15
28	100	53	25	17	28	125	40	13	24	13	10	16
29	95	70	24	16	---	110	38	14	26	12	10	18
30	94	82	24	16	---	100	36	15	35	11	10	18
31	95	---	25	16	---	121	---	17	---	10	10	---
TOTAL	3078	1542	1143	694	525	4443	2982	379.2	1682	727	218.1	309.3
MEAN	99.3	51.4	36.9	22.4	18.8	143	99.4	12.2	56.1	23.5	7.04	10.3
MAX	335	97	80	41	28	445	243	32	206	45	10	18
MIN	35	32	22	16	16	20	36	5.6	18	10	2.1	5.3
CFSM	1.80	.93	.67	.41	.34	2.59	1.80	.22	1.01	.43	.13	.19
IN.	2.07	1.04	.77	.47	.35	2.99	2.01	.26	1.13	.49	.15	.21

CAL YR 1981 TOTAL 15968.6 MEAN 43.7 MAX 335 MIN 5.9 CFSM .79 IN 10.74
WTR YR 1982 TOTAL 17722.6 MEAN 48.6 MAX 445 MIN 2.1 CFSM .88 IN 11.92

04146063 SOUTH BRANCH FLINT RIVER NEAR COLUMBIAVILLE, MI

LOCATION.--Lat 43°09'34", long 83°21'03", in NE¼ NE¼ sec.36, T.9 N., R.9 E., Lapeer County, Hydrologic Unit 04080204, on right bank at upstream side of bridge on Columbiaville Road, 3.0 miles (4.8 km) east of Columbiaville, and 3.2 miles (5.1 km) upstream from confluence of North and South Branches.

DRAINAGE AREA.--221 mi² (572 km²).

PERIOD OF RECORD.--March 1980 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 765 ft (233 m), from topographic map.

REMARKS.--Records good except those for the winter period and those for August and September, which are fair. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,510 ft³/s (71.1 m³/sec) Mar. 15, 1982, gage height, 8.34 ft (2.542 m); minimum, 18 ft³/s (0.51 m³/s) Aug. 25, 26, 27, 1981; minimum gage height, 1.36 ft (0.415 m) Aug. 26, 27, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,510 ft³/s (71.1 m³/s) Mar. 15, gage height, 8.34 ft (2.542 m); minimum daily, 30 ft³/s (0.85 m³/s) Sept. 11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	372	315	260	122	80	100	906	144	409	116	63	57
2	1140	291	247	116	80	100	980	139	864	112	71	48
3	1180	266	233	132	80	98	964	126	696	103	78	46
4	1090	239	218	146	79	96	807	114	541	102	74	57
5	1020	219	202	191	79	96	655	107	473	116	67	47
6	825	245	186	206	79	98	521	103	370	148	67	46
7	658	249	178	189	79	100	429	109	270	137	64	47
8	544	227	175	166	80	100	419	163	200	112	60	50
9	468	205	168	150	81	110	410	177	165	93	57	51
10	405	187	162	135	82	180	408	160	145	81	52	57
11	343	176	155	125	82	229	403	139	127	92	69	30
12	291	166	146	120	83	316	401	125	112	91	51	32
13	248	157	130	110	83	517	410	115	99	81	44	33
14	214	154	126	105	84	1640	434	103	89	73	52	39
15	203	149	124	100	86	2430	416	94	80	74	44	35
16	196	144	116	98	88	2260	391	88	97	76	42	37
17	182	142	118	94	90	1980	378	83	98	90	40	37
18	180	139	122	92	92	1380	365	79	99	123	35	56
19	186	138	120	90	94	1180	347	77	138	119	34	61
20	179	164	120	88	98	1090	325	79	183	109	36	59
21	174	234	120	86	105	982	299	78	173	100	34	51
22	203	240	121	84	105	915	270	80	165	94	34	51
23	225	226	120	84	110	850	242	88	155	85	38	62
24	219	213	124	82	105	800	219	95	134	79	40	65
25	204	196	125	82	100	750	202	96	118	73	98	69
26	194	185	122	81	100	694	195	96	109	67	101	63
27	196	228	120	81	100	599	176	96	106	72	88	67
28	350	281	120	81	100	508	166	99	98	84	53	97
29	405	281	119	80	---	445	158	118	103	81	61	94
30	372	269	111	80	---	421	151	152	112	72	72	92
31	342	---	121	80	---	592	---	138	---	66	72	---
TOTAL	12808	6325	4629	3476	2504	21646	12447	3460	6528	2921	1791	1436
MEAN	413	211	149	112	89.4	699	415	112	218	94.2	57.8	54.5
MAX	1180	315	260	206	110	2430	980	177	864	148	101	97
MIN	174	138	111	80	79	96	151	77	80	66	34	30
CFSM	1.87	.96	.67	.51	.41	3.16	1.88	.51	.99	.43	.26	.25
IN.	2.16	1.06	.78	.59	.42	3.65	2.10	.58	1.10	.49	.30	.28

CAL YR 1981 TOTAL 71192 MEAN 195 MAX 1180 MIN 18 CFSM .88 IN 11.98
WTR YR 1982 TOTAL 80191 MEAN 220 MAX 2430 MIN 30 CFSM 1.00 IN 13.50

04147000 HOLLOWAY RESERVOIR NEAR OTISVILLE, MI

LOCATION.--Lat 43°07'15", long 83°29'45", in NW¼ sec.11, T.8 N., R.8 E., Genesee County, Hydrologic Unit 04080204, in gatehouse on right side of Holloway Dam on Flint River, 3.5 mi (5.6 km) southeast of Otisville.

DRAINAGE AREA.--526 mi² (1,362 km²).

PERIOD OF RECORD.--March 1954 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is National Geodetic Vertical Datum of 1929 (levels by city of Flint).

REMARKS.--Reservoir is formed by an earth-fill dam with concrete spillway completed in 1953. Capacity of reservoir, 1,256,000,000 cu ft (35.6 hm³) at elevation 760.00 ft (231.65 m). The spillway section includes two 90 foot (27.4 m) drum gates with minimum crest elevation of 751 ft (228.9 m), maximum at 755 ft (230.1 m), three 20-foot (6.1 m) radial gates with sill elevation of 745 ft (227.1 m), and 2 sluices (each 4 by 6 ft), one on each side with valve controls. Entrance elevation of sluiceways is 724 ft (220.7 m). Reservoir is used to regulate flow for sewage dilution for city of Flint.

COOPERATION.--Reservoir elevations furnished by city of Flint.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 996,000,000 cu ft (28.2 hm³) Mar. 8, 1956, elevation, 757.4 ft (230.86 m); minimum, reservoir empty at times during October, November, 1954, January, February, 1955, October, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 888,000,000 cu ft (25.1 hm³) Oct. 4, elevation, 756.31 ft (230.52 m); minimum, 422,000,000 cu ft (12.0 hm³) Dec. 13, elevation, 750.15 ft (228.65 m).

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

Date	Elevation (feet)	Contents (millions of cubic feet)	Change in contents during month: Millions of cubic feet	Change in contents during month: Equivalent in ft³/s
Sept. 30	755.25	792	--	--
Oct. 31	752.42	566	-226	-84.4
Nov. 30	751.55	506	-60	-23.1
Dec. 31	751.06	477	-29	-10.8
CAL YR 1981	--	--	-40	-1.3
Jan. 31	751.25	488	+11	+4.1
Feb. 28	751.19	484	-4	-1.7
Mar. 31	*753.4	639	+155	+57.9
Apr. 30	753.76	668	+29	+11.2
May 31	755.28	795	+127	+47.4
June 30	*755.24	792	-3	-1.2
July 31	*755.0	770	-22	-8.2
Aug. 31	*755.0	770	0	0
Sept. 30	754.85	756	-14	-5.4
WTR YR 1982	--	--	-36	-1.1

* Estimated

04147500 FLINT RIVER NEAR OTISVILLE, MI

LOCATION.--Lat 43°06'40", long 83°31'10", in SE¼ sec.9, T.8 N., R.8 E., Genesee County, Hydrologic Unit 04080204, on left bank 20 ft (6 m) downstream from bridge on State Highway 15, 1.5 mi (2.4 km) downstream from Holloway Reservoir, 3.5 mi (5.6 km) upstream from Powers-Cullen drain, and 3.8 mi (6.1 km) south of Otisville.

DRAINAGE AREA.--530 mi² (1,373 km²).

PERIOD OF RECORD.--October 1952 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 721.39 ft (219.880 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated by Holloway Reservoir, 1.5 mi (2.4 km) above station (see preceding page). Several observations of water temperature were made during the year. City of Flint gage-height telemark at station.

AVERAGE DISCHARGE.--30 years, 302 ft³/s (8.553 m³/s), 7.74 in/yr (197 mm/yr), adjusted for storage since 1954.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,150 ft³/s (174 m³/s) Apr. 1, 1960, gage height, 14.97 ft (4.563 m); minimum, 2.1 ft³/s (0.059 m³/s) Oct. 11, 12, 1971, gage height, 1.57 ft (0.479 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,200 ft³/s (119 m³/s) Mar. 17, gage height, 13.55 ft (4.130 m); minimum, 73 ft³/s (2.07 m³/s) Aug. 16, gage height, 2.44 ft (0.744 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1220	766	659	243	230	234	1130	127	744	250	119	121
2	2040	748	633	240	235	236	1380	128	1140	230	126	119
3	3110	732	597	236	208	233	1620	128	1660	223	124	117
4	3350	712	561	267	199	223	1660	128	1520	221	125	117
5	2850	696	521	298	192	227	1570	130	1320	199	127	116
6	2320	682	497	338	194	218	1540	131	1080	204	117	117
7	1860	668	467	363	191	219	1530	133	704	204	110	116
8	1560	656	522	352	189	218	1120	145	614	204	107	109
9	1370	378	526	332	188	217	630	199	570	180	101	109
10	1270	202	507	317	188	214	698	255	456	170	95	109
11	1180	330	504	299	188	223	708	264	386	168	92	109
12	1100	379	504	275	186	245	734	270	347	165	90	109
13	1020	390	443	259	188	469	758	259	301	164	84	109
14	928	381	291	244	189	686	788	243	260	149	81	110
15	872	367	191	233	189	1400	804	224	236	149	82	111
16	820	352	191	227	193	3110	935	202	252	136	78	110
17	776	335	192	218	198	4080	1030	193	245	154	104	110
18	748	323	192	120	201	4050	958	177	270	174	130	111
19	538	332	192	141	210	3770	846	172	344	184	117	110
20	260	349	192	181	212	3320	688	179	390	170	115	109
21	369	398	192	221	215	2790	498	190	432	153	113	109
22	464	455	194	199	220	2420	466	184	429	143	109	109
23	528	494	195	192	227	2170	474	178	454	138	109	108
24	526	556	195	189	234	2000	478	183	464	123	110	107
25	526	584	195	186	233	1880	466	198	451	109	115	108
26	582	529	195	183	227	1780	356	208	429	116	114	108
27	684	518	203	180	225	1630	148	217	371	136	121	111
28	686	563	215	176	229	1470	140	218	322	152	123	117
29	736	591	226	148	---	1070	127	232	316	140	123	129
30	792	608	230	132	---	816	127	405	270	132	125	134
31	780	---	232	162	---	942	---	495	---	126	128	---
TOTAL	35865	15074	10654	7151	5778	42560	24407	6395	16777	5166	3414	3388
MEAN	1157	502	344	231	206	1373	814	206	559	167	110	113
MAX	3350	766	659	363	235	4080	1660	495	1660	250	130	134
MIN	260	202	191	120	186	214	127	127	236	109	78	107
MEAN +	1073	479	333	235	205	1431	825	254	558	158	110	108
CFSM +	2.02	.90	.63	.44	.39	2.70	1.56	.48	1.05	.30	.21	.20
IN +	2.33	1.01	.72	.51	.40	3.11	1.74	.55	1.17	.34	.24	.23

CAL YR 1981 TOTAL 179054 MEAN 491 MAX 3350 MIN 53 MEAN + 489 CFSM + .92 IN + 12.53
WTR YR 1982 TOTAL 176629 MEAN 484 MAX 4080 MIN 78 MEAN + 483 CFSM + .91 IN + 12.37

+ Adjusted for change in contents in Holloway Reservoir.

04147990 BUTTERNUT CREEK NEAR GENESEE, MI

LOCATION.--Lat 43°08'09", long 83°35'57", in NE¼ NE¼ sec.2, T.8 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft (3 m) downstream from bridge on Frances Road, 2.3 mi (3.7 km) upstream from mouth, and 2.0 mi (3.2 km) northeast of Genesee.

DRAINAGE AREA.--34.7 mi² (89.9 km²).

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area. WDR MI-81: 1971-72(P), 1973, 1974-79(P).

GAGE.--Water-stage recorder. Altitude of gage is 730 ft (223 m) from topographic map (nearest 10 ft). Prior to June 11, 1970, non-recording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--12 years, 21.5 ft³/s (0.609 m³/s), 8.41 in/yr (214 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,800 ft³/s (51.0 m³/s) Oct. 1, 1981, gage height, 9.00 ft (2.743 m); minimum, 1.2 ft³/s (0.034 m³/s) Dec. 1, 1971, result of freezeup, Oct. 3, 1978; minimum gage height, 1.48 ft (0.451 m) July 23, 27, 28, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 200 ft³/s (5.66 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	1100	*1,800	51.0	*9.00	2.743	Mar. 31	0500	290	8.21	7.50	2.286
Mar. 13	unknown	1,120	31.7	8.60	2.621	June 1	1000	278	7.87	7.43	2.265

Minimum discharge, 3.2 ft³/s (0.091 m³/s) Sept. 12, 13, gage height, 1.53 ft (0.466 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	996	29	30	16	9.5	11	94	13	210	12	4.6	4.6
2	252	27	40	18	9.5	11	72	12	86	11	4.6	6.6
3	189	25	35	21	9.5	11	64	12	55	11	4.6	8.8
4	144	23	32	38	9.5	11	51	11	34	10	4.5	4.8
5	109	23	29	53	9.5	11	41	11	24	9.5	4.5	12
6	93	26	26	35	9.5	11	33	11	19	8.9	4.5	6.8
7	80	24	26	25	9.5	11	43	11	15	8.4	4.5	4.6
8	67	22	26	20	9.4	11	38	12	13	7.8	4.3	4.0
9	56	21	25	17	9.4	11	47	12	11	7.3	4.3	11
10	45	19	23	16	9.4	13	50	12	11	7.0	4.2	10
11	36	19	21	15	9.4	15	46	11	10	6.6	4.2	5.7
12	30	18	19	14	9.4	35	44	10	9.8	6.5	4.0	3.7
13	27	17	19	13	9.4	480	56	10	9.5	6.3	4.0	9.1
14	25	17	18	13	9.4	280	46	9.5	9.3	6.0	4.0	8.7
15	28	16	18	12	9.8	240	38	9.3	9.1	5.7	3.9	5.5
16	31	16	17	12	10	228	34	8.7	9.7	4.6	3.7	9.5
17	28	16	17	11	11	225	51	8.5	9.8	7.5	3.7	8.2
18	36	16	17	11	11	177	41	8.0	9.3	7.1	3.7	14
19	35	15	16	11	11	160	35	7.6	31	6.0	3.6	9.8
20	30	51	16	11	12	133	33	7.5	26	5.5	3.6	5.0
21	38	53	16	10	12	122	29	7.1	20	5.1	3.5	6.6
22	53	34	15	10	12	109	25	6.8	23	4.9	3.5	5.1
23	41	29	15	10	12	104	22	6.6	15	4.9	3.5	4.6
24	34	25	15	10	12	100	20	6.6	11	4.8	3.3	4.2
25	31	23	15	10	12	87	18	6.6	10	4.6	3.7	4.0
26	29	26	15	9.8	12	70	17	6.6	10	4.5	4.2	9.1
27	38	64	15	9.8	11	55	15	6.6	9.7	4.5	4.0	9.1
28	49	38	15	9.8	11	45	14	6.5	30	4.8	3.6	9.5
29	38	31	15	9.6	---	41	14	6.6	101	4.8	3.5	6.0
30	33	28	15	9.6	---	55	13	48	14	4.8	3.7	5.2
31	31	---	15	9.6	---	223	---	28	---	4.8	3.7	---
TOTAL	2744	791	636	490.2	291.1	3096	1144	343.1	855.2	207.2	123.2	215.9
MEAN	88.5	26.4	20.5	15.8	10.4	99.9	38.1	11.1	28.5	6.68	3.97	7.20
MAX	996	64	40	53	12	480	94	48	210	12	4.6	14
MIN	25	15	15	9.6	9.4	11	13	6.5	9.1	4.5	3.3	3.7
CFSM	2.55	.76	.59	.46	.30	2.88	1.10	.32	.82	.19	.11	.21
IN.	2.94	.85	.68	.53	.31	3.32	1.23	.37	.92	.22	.13	.23

CAL YR 1981 TOTAL 11809.7 MEAN 32.4 MAX 996 MIN 3.5 CFSM .93 IN 12.66
WTR YR 1982 TOTAL 10936.9 MEAN 30.0 MAX 996 MIN 3.3 CFSM .87 IN 11.72

04148140 KEARSLEY CREEK NEAR DAVISON, MI

LOCATION.--Lat 43°02'01", long 83°34'53", in NE¼ sec.12, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft (3 m) upstream from bridge on State Highway 21, 1.4 mi (2.3 km) downstream from Black Creek, and 3.3 mi (5.3 km) west of Davison.

DRAINAGE AREA.--99.4 mi² (257.4 km²).

PERIOD OF RECORD.--October 1965 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 747.39 ft (227.804 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Some diurnal fluctuation caused by small dams, and occasional diversion for sprinkler irrigation above station. Several observations of water temperature were made during the year. Gage-height telemark at station.

AVERAGE DISCHARGE.--17 years, 70.1 ft³/s (1.985 m³/s), 9.58 in/yr (243 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,430 ft³/s (40.5 m³/s) Apr. 21, 1975, gage height, 11.32 ft (3.450 m); minimum, 2.5 ft³/s (0.071 m³/s) Sept. 10, 1978; minimum gage height, 2.69 ft (0.820 m) Sept. 12, 1969.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 350 ft³/s (9.91 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	2000	*1,350	38.2	*11.18	3.408	Mar. 31	1000	458	13.0	8.15	2.484
Mar. 13	2000	1,200	34.0	10.92	3.328	June 1	1200	353	10.0	7.48	2.280
Mar. 17	0400	882	25.0	9.98	3.042	June 28	2400	436	12.3	8.22	2.505

Minimum discharge, 7.1 ft³/s (0.20 m³/s) Sept. 12, 13; minimum gage height, 2.93 ft (0.893 m) Aug. 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	918	139	119	38	30	35	394	65	267	92	19	16
2	846	130	112	41	30	35	397	58	183	69	24	15
3	534	128	103	53	30	35	386	51	230	58	20	14
4	542	132	97	99	30	35	334	44	278	94	18	14
5	525	104	91	119	30	35	237	39	221	58	17	13
6	415	97	73	95	30	35	196	38	149	47	15	12
7	342	84	67	75	30	36	177	48	103	40	14	12
8	274	79	66	65	30	36	164	55	75	35	17	11
9	195	78	60	55	30	40	177	66	59	31	14	10
10	167	75	58	50	30	80	177	76	54	29	13	9.8
11	145	72	56	46	30	136	171	70	49	34	12	9.5
12	138	67	53	44	30	210	175	70	43	26	11	8.2
13	121	64	48	40	30	850	210	61	35	26	10	8.2
14	98	61	45	39	31	966	209	49	32	26	9.5	9.2
15	98	59	41	37	32	652	198	39	33	24	8.9	15
16	113	57	36	36	32	777	169	36	37	21	13	13
17	106	56	34	35	33	849	157	35	38	61	12	12
18	104	55	35	33	33	652	142	33	40	46	12	33
19	97	54	37	32	34	549	138	29	68	53	11	21
20	83	85	38	32	35	493	135	19	65	55	14	20
21	83	98	38	31	36	401	123	18	61	57	12	20
22	114	85	37	30	37	345	112	21	67	38	11	22
23	108	84	37	30	38	319	102	24	70	20	11	22
24	102	84	37	30	37	313	93	30	61	15	10	22
25	98	80	37	30	36	372	85	32	50	15	52	28
26	94	78	38	30	36	305	79	35	34	17	26	40
27	124	112	38	30	35	225	65	38	29	24	26	53
28	273	105	38	30	35	200	44	60	98	26	22	49
29	159	108	37	30	---	188	55	48	312	22	17	36
30	175	121	37	30	---	175	69	48	128	24	19	33
31	186	---	37	30	---	483	---	45	---	22	16	---
TOTAL	7321	2631	1688	1395	910	9724	5178	1380	2969	1205	506.4	608.9
MEAN	236	87.7	54.2	45.0	32.5	314	173	44.5	99.0	38.9	16.3	20.0
MAX	918	139	119	119	38	966	397	76	312	94	52	53
MIN	83	54	34	30	30	35	44	18	29	15	8.9	8.2
CFSM	2.37	.88	.55	.45	.33	3.16	1.74	.45	1.00	.39	.16	.20
IN.	2.74	.98	.63	.52	.34	3.64	1.94	.52	1.11	.45	.19	.22

CAL YR 1981 TOTAL 34562.0 MEAN 94.7 MAX 918 MIN 4.2 CFSM .95 IN 12.93
WTR YR 1982 TOTAL 35500.3 MEAN 97.3 MAX 966 MIN 8.2 CFSM .98 IN 13.29

04148160 GILKEY CREEK NEAR FLINT, MI

LOCATION.--Lat 43°01'27", long 83°37'32", in NE¼ SW¼ sec.10, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on right bank 25 ft (8 m) downstream from culvert on extension of Arapaho Street, 5.1 mi (8.2 km) upstream from mouth, and 3.5 mi (5.6 km) east of Flint.

DRAINAGE AREA.--6.43 mi² (16.65 km²).

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 747.56 ft (227.856 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records fair except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--12 years, 4.80 ft³/s (0.136 m³/s), 10.14 in/yr (258 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 393 ft³/s (11.1 m³/s) Oct. 1, 1981, gage height, 8.93 ft (2.722 m); no flow on many days during 1970, 1973-80.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 80 ft³/s (2.27 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	1500	*393	11.1	*8.93	2.722	June 1	0500	123	3.48	4.54	1.384
Mar. 13	1900	271	7.67	7.43	2.265	June 28	2400	174	4.93	5.63	1.716
Mar. 31	0300	99	2.80	4.01	1.222						

Minimum discharge, 0.04 ft³/s (0.001 m³/s) Sept. 14, gage height, 0.76 ft (0.232 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	334	4.7	2.7	1.2	.22	.25	19	1.3	60	2.5	.19	.12
2	127	3.9	2.8	1.3	.22	.25	7.0	1.2	12	1.2	.56	.12
3	34	3.2	2.3	1.5	.22	.25	6.6	1.3	3.9	1.4	.27	.12
4	20	2.8	2.0	11	.22	.25	3.5	1.1	2.3	1.3	.20	.09
5	12	3.2	1.7	5.0	.22	.25	2.0	1.1	1.6	.74	.17	.08
6	23	5.1	1.6	2.0	.22	.25	4.1	.97	1.1	.62	.16	.08
7	17	3.4	1.7	1.1	.22	.26	2.3	5.5	.95	.51	.15	.09
8	8.4	2.6	2.0	.94	.22	.26	3.9	2.5	.82	.45	.55	.08
9	5.0	2.2	1.7	.73	.22	.27	8.6	1.4	.75	.39	.22	.08
10	3.6	1.9	1.4	.61	.22	.30	11	1.2	.71	.41	.15	.07
11	2.8	1.8	1.3	.52	.22	1.2	9.6	1.1	.64	.59	.12	.08
12	2.3	1.5	1.2	.46	.22	25	9.9	1.1	.56	.37	.11	.06
13	2.1	1.4	1.1	.41	.22	218	17	.97	.55	.28	.10	.05
14	2.1	1.3	1.2	.38	.22	129	7.0	.93	.48	.30	.09	.06
15	5.4	1.3	1.2	.34	.23	61	3.9	.86	1.5	.37	.09	.49
16	3.5	1.3	1.1	.31	.23	58	3.2	.86	.96	.24	.09	.15
17	2.7	1.3	1.1	.29	.24	47	4.8	.75	.56	19	.08	.25
18	11	1.3	1.1	.28	.24	29	3.7	.59	.50	.86	.07	7.9
19	8.5	1.3	1.1	.27	.25	25	2.0	.59	11	.42	.07	.25
20	4.2	17	1.1	.25	.26	20	2.1	.56	1.1	.34	.43	.13
21	7.0	12	1.1	.25	.26	19	1.6	.54	.77	.29	.23	.10
22	19	5.0	1.1	.24	.27	14	1.2	.62	.60	.26	.17	.31
23	11	3.2	1.1	.23	.27	11	1.1	.59	.48	.24	.17	.28
24	6.4	2.6	1.1	.22	.27	10	1.0	.54	.43	.21	.12	.17
25	4.4	2.2	1.1	.22	.26	7.5	1.0	.51	.39	.19	22	.31
26	3.4	4.3	1.1	.22	.26	4.4	1.0	.48	.45	.23	.37	.33
27	24	14	1.2	.22	.25	4.1	.95	.56	.41	1.5	.21	4.9
28	42	5.6	1.1	.22	.25	2.3	1.2	4.6	33	.86	.16	.44
29	17	3.4	1.1	.22	---	1.6	1.2	2.2	74	.30	.15	.24
30	9.4	2.7	1.1	.22	---	10	1.4	2.7	9.6	.21	.34	.17
31	6.5	---	1.1	.22	---	68	---	1.7	---	.20	.15	---
TOTAL	778.7	117.5	43.6	31.37	6.62	757.69	142.85	48.92	222.11	36.78	27.94	18.60
MEAN	25.1	3.92	1.41	1.01	.26	24.4	4.76	1.32	7.40	1.19	.90	.62
MAX	334	17	2.8	11	.27	218	19	5.5	74	19	22	7.9
MIN	2.1	1.3	1.1	.22	.22	.25	.95	.48	.39	.19	.07	.05
CFSM	3.90	.61	.22	.16	.04	3.80	.74	.21	1.15	.19	.14	.10
IN.	4.50	.68	.25	.18	.04	4.38	.83	.24	1.28	.21	.16	.11

CAL YR 1981 TOTAL 2998.02 MEAN 8.21 MAX 334 MIN .07 CFSM 1.28 IN 17.34
WTR YR 1982 TOTAL 2224.68 MEAN 6.10 MAX 334 MIN .05 CFSM .95 IN 12.87

STREAMS TRIBUTARY TO LAKE HURON

04148500 SHARTZ CREEK AT FLINT, MI

LOCATION.--Lat 42°59'16", long 83°43'57", in NW¼ sec.26, T.7 N., R.6 E., Genesee County, Hydrologic Unit 04080204, on right bank 6 ft (2 m) downstream from bridge on South Ballenger Highway, in Flint, 3.6 mi (5.8 km) upstream from mouth.

DRAINAGE AREA.--115 mi² (298 km²).

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-75: 1971-73.

GAGE.--Water-stage recorder. Datum of gage is 727.05 ft (221.605 m) National Geodetic Vertical Datum of 1929. Prior to Sept. 4, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period and those below 10 ft³/s (0.28 m³/s), which are fair. Several observations of water temperature were made during the year. Gage-height telemark at station.

AVERAGE DISCHARGE.--12 years, 80.0 ft³/s (2.266 m³/s), 9.45 in/yr (240 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,160 ft³/s (89.5 m³/s) Apr. 19, 1975, gage height, 9.02 ft (2.749 m); minimum, 0.01 ft³/s (<0.001 m³/s) Sept. 9, 1978; minimum gage height, 1.16 ft (0.354 m) Aug. 19, 1971, Aug. 26, 1981.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 800 ft³/s (22.7 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	1000	2,050	58.1	8.26	2.518	Mar. 13	0900	*2,220	62.9	*8.28	2.524

Minimum daily discharge, 2.7 ft³/s (0.076 m³/s) Sept. 13; minimum gage height, 1.40 ft (0.427 m) Sept. 13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1820	102	105	40	20	22	484	49	292	30	8.8	4.8
2	1400	95	111	40	20	22	338	44	163	27	18	4.4
3	772	89	99	45	20	22	301	41	94	29	9.5	4.0
4	526	85	91	194	20	23	262	36	82	25	9.0	3.7
5	421	85	84	190	20	23	230	33	88	23	8.2	3.5
6	487	88	81	115	20	23	204	30	100	20	7.6	3.5
7	531	81	80	95	20	23	212	42	103	18	6.8	3.4
8	395	75	83	70	20	24	195	41	100	16	12	3.7
9	313	70	78	58	20	24	214	35	92	14	7.1	3.3
10	259	66	72	50	20	27	247	31	85	27	5.8	2.9
11	216	63	68	44	20	60	246	29	75	33	5.3	2.9
12	181	60	64	39	20	280	265	28	66	20	4.9	2.9
13	154	57	60	36	20	1850	323	30	59	14	4.5	2.7
14	133	54	57	33	20	1550	244	27	52	21	4.4	5.4
15	120	52	55	30	20	1010	189	25	63	17	4.8	5.2
16	113	49	54	27	21	829	167	23	88	11	3.5	3.7
17	101	47	54	26	21	841	178	22	64	65	4.5	4.5
18	115	45	54	24	22	676	151	20	52	35	3.4	39
19	107	43	53	23	23	580	133	18	95	20	3.2	9.4
20	94	151	54	22	23	541	128	16	75	15	8.5	6.7
21	96	163	55	21	24	517	117	14	100	12	7.5	5.1
22	118	112	56	21	25	470	107	23	76	11	5.0	15
23	106	98	57	20	25	430	99	19	56	11	4.0	10
24	92	79	51	20	25	404	94	15	48	10	3.8	9.3
25	82	72	45	20	24	365	88	14	42	9.4	180	14
26	75	81	47	20	23	317	82	13	40	12	14	8.7
27	133	168	46	20	23	268	75	15	36	13	6.9	36
28	246	158	44	20	22	249	67	24	42	24	5.1	20
29	170	126	42	20	---	229	61	30	44	14	6.2	11
30	134	105	39	20	---	265	54	26	35	10	8.2	8.3
31	114	---	39	20	---	685	---	20	---	9.1	5.4	---
TOTAL	9833	2611	1978	1423	601	12658	5555	833	2407	615.5	385.1	259.0
MEAN	317	87.0	63.8	45.9	21.5	408	185	26.9	80.2	19.9	12.4	8.63
MAX	1820	168	111	194	25	1850	484	49	292	65	180	39
MIN	75	43	39	20	20	22	54	13	35	9.1	3.2	2.7
CFSM	2.76	.76	.56	.40	.19	3.55	1.61	.23	.70	.17	.11	.08
IN.	3.18	.84	.64	.46	.19	4.09	1.80	.27	.78	.20	.12	.08

CAL YR 1981 TOTAL 37384.06 MEAN 102 MAX 1820 MIN .54 CFSM .89 IN 12.09
WTR YR 1982 TOTAL 39158.60 MEAN 107 MAX 1850 MIN 2.7 CFSM .93 IN 12.67

04148440 THREAD CREEK NEAR FLINT, MI

LOCATION.--Lat 42°58'30", long 83°38'09", in SE¼ SE¼ sec.28, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on left bank 20 ft (6 m) downstream from bridge on Bristol Road, 6.0 mi (9.7 km) upstream from mouth, and 4.0 mi (6.4 km) southeast of Flint.

DRAINAGE AREA.--54.4 mi² (140.9 km²).

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 764.36 ft (232.977 m) National Geodetic Vertical Datum of 1929. Prior to May 13, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period and those for September, which are poor. Several observations of water temperature were made during the year. Gage-height telemark at station.

AVERAGE DISCHARGE.--12 years, 37.2 ft³/s (1.054 m³/s), 9.29 in/yr (236 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,260 ft³/s (35.7 m³/s) Apr. 19, 1975, gage height, 7.65 ft (2.332 m) from high water marks; no flow Aug. 7, 8, 10, 1971.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 300 ft³/s (8.50 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	0900	912	25.8	6.87	2.094	Mar. 14	1100	ice jam		*7.11	2.167
Mar. 13	2000	*1,020	28.9	7.10	2.164						

Minimum daily discharge, 0.95 ft³/s (0.027 m³/s) Sept. 12; minimum gage height, 0.77 ft (0.235 m) Aug. 16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	632	83	69	18	15	17	233	28	145	26	7.1	5.0
2	397	69	61	20	15	17	181	26	148	20	9.7	4.3
3	358	58	54	30	15	17	151	23	177	17	7.7	4.1
4	232	53	49	82	15	17	127	21	138	15	6.8	3.7
5	167	56	44	81	15	17	104	19	111	13	6.4	3.3
6	182	53	40	68	15	17	85	17	88	12	6.0	3.1
7	160	46	38	50	15	17	97	31	70	10	5.1	2.9
8	120	43	37	40	15	17	93	36	55	9.1	5.4	2.6
9	95	39	34	30	15	19	92	40	43	8.3	5.3	2.3
10	77	36	32	24	15	40	95	34	34	7.8	4.6	1.8
11	63	33	29	22	15	70	102	28	26	11	3.9	1.2
12	52	30	26	20	15	130	104	23	22	11	3.8	.95
13	44	27	24	19	15	670	119	21	20	9.1	3.7	1.1
14	38	28	23	18	15	890	113	18	18	8.3	2.6	2.2
15	30	30	22	18	16	743	102	16	22	8.6	2.2	5.5
16	34	29	21	17	16	453	91	15	35	8.0	2.0	3.4
17	31	27	20	17	16	306	95	16	31	28	2.3	2.9
18	45	24	19	16	17	254	83	14	28	20	2.4	20
19	38	24	18	16	17	216	76	12	42	18	2.0	6.7
20	34	69	17	15	18	102	70	9.5	35	16	6.1	4.2
21	35	61	16	15	18	172	61	8.9	48	13	5.1	3.5
22	51	55	16	15	19	159	55	9.2	41	11	3.5	5.2
23	45	52	15	15	19	146	48	11	36	9.7	3.3	6.4
24	45	45	15	15	18	138	43	11	30	8.8	3.0	5.6
25	42	41	16	15	18	130	38	11	23	7.7	28	5.9
26	39	39	17	15	18	117	35	10	18	8.0	10	8.3
27	76	83	17	15	17	100	37	11	16	7.7	7.6	21
28	130	86	17	15	17	87	35	13	29	11	6.8	14
29	179	96	17	15	---	78	33	15	46	9.1	5.9	10
30	127	81	17	15	---	88	31	14	35	8.5	7.6	8.1
31	102	---	17	15	---	267	---	10	---	7.8	5.9	---
TOTAL	3459	1496	857	786	454	5541	2629	580.6	1610	378.5	181.8	169.25
MEAN	118	49.9	27.6	25.4	16.2	179	87.6	18.7	53.7	12.2	5.86	5.64
MAX	632	96	69	82	19	890	233	40	177	28	28	21
MIN	31	24	15	15	15	17	31	8.9	16	7.7	2.0	.95
CFSM	2.17	.92	.51	.47	.30	3.29	1.61	.34	.99	.22	.11	.10
IN.	2.58	1.02	.59	.54	.31	3.79	1.80	.40	1.10	.26	.12	.12

CAL YR 1981 TOTAL 15876.49 MEAN 43.5 MAX 632 MIN .69 CFSM .80 IN 10.86
WTR YR 1982 TOTAL 18342.15 MEAN 50.3 MAX 890 MIN .95 CFSM .93 IN 12.54

04148500 FLINT RIVER NEAR FLINT, MI

LOCATION.--Lat 43°02'20", long 83°46'10", in SW¼ sec.4, T.7 N., R.6 E., Genesee County, Hydrologic Unit 04080204, on left bank on grounds of sewage-treatment plant, 1.2 mi (1.9 km) upstream from Pirnie Creek, 1.8 mi (2.9 km) downstream from Flint, and 5.0 mi (8.0 km) downstream from Swartz Creek.

DRAINAGE AREA.--956 mi² (2,476 km²).

PERIOD OF RECORD.--September 1903 to March 1904 (gage heights only), August 1932 to current year. Gage-height records for flood seasons collected in this vicinity 1911-32, are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 954: 1941. WSP 1337: 1933-34(M), 1935-37. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 678.80 ft (206.898 m) National Geodetic Vertical Datum of 1929 (levels by U.S. Weather Bureau and city of Flint).

REMARKS.--Records good.Some regulation by reservoirs above station (station 04147000). Occasional diversion for industrial use. Since Dec. 17, 1967, flow contains up to 50 ft³/s (1.42 m³/s) as sewage effluent which originates outside the basin. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--50 years, 586 ft³/s (16.60 m³/s), 8.32 in/yr (211 mm/yr), adjusted for storage since 1954.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,900 ft³/s (422 m³/s) Apr. 6, 1947, gage height, 16.35 ft (4.983 m); minimum, 9.0 ft³/s (0.25 m³/s) Aug. 7, 1934.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 9,610 ft³/s (272 m³/s) Oct. 1, gage height, 14.97 ft (4.563 m); minimum, 121 ft³/s (3.43 m³/s) Aug. 16, gage height, 2.93 ft (0.893 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8430	1460	1180	490	337	441	2980	328	2550	616	216	204
2	7670	1420	1160	446	415	446	2490	329	2140	547	300	203
3	5790	1310	1060	466	377	418	2660	317	2350	524	241	194
4	5450	1270	1000	880	365	415	2750	326	2330	496	231	183
5	4880	1280	931	885	351	418	2630	325	2160	458	229	172
6	4660	1290	887	785	351	387	2310	339	1760	402	219	183
7	3890	1210	855	790	330	382	2390	419	1220	385	201	190
8	3120	1170	868	690	347	371	1930	371	1020	380	230	180
9	2550	1020	849	601	351	394	1390	391	949	332	197	172
10	2290	584	786	546	337	393	1510	473	853	350	183	170
11	2160	688	774	515	333	722	1550	504	656	381	167	167
12	1970	770	779	524	346	945	1480	518	582	330	163	162
13	1640	771	766	474	341	5570	1750	504	529	313	158	169
14	1580	770	626	458	340	6510	1680	467	484	405	151	267
15	1610	747	488	430	378	4960	1560	431	562	326	142	311
16	1470	733	445	388	406	5440	1620	385	584	261	137	203
17	1390	703	416	369	374	6460	1830	367	498	807	143	196
18	1430	665	385	269	375	6740	1730	339	489	495	150	519
19	1380	678	389	292	393	6050	1590	312	805	381	167	255
20	793	1040	407	309	397	5380	1310	326	750	373	286	209
21	947	1060	401	392	407	4910	1030	322	819	339	222	202
22	1080	987	420	369	442	4260	915	352	793	315	173	268
23	1170	976	439	373	471	3670	872	315	741	286	174	249
24	1130	965	439	347	461	3400	856	317	733	258	173	222
25	1090	1040	420	340	443	3120	854	334	715	238	738	281
26	1070	986	415	340	428	2920	819	348	700	219	271	266
27	1250	1130	392	333	422	2680	469	382	591	247	224	420
28	1660	1140	396	326	426	2300	339	499	1070	387	206	354
29	1540	1090	399	316	---	2020	325	500	2060	287	208	304
30	1630	1090	407	273	---	1290	328	653	651	255	264	279
31	1580	---	423	266	---	3120	---	793	---	234	226	---
TOTAL	78300	30043	19602	14282	10744	86532	45947	12586	32144	11627	6790	7154
MEAN	2526	1001	632	461	384	2791	1532	406	1071	375	219	238
MAX	8430	1460	1180	885	471	6740	2980	793	2550	807	738	519
MIN	793	584	385	266	330	371	325	312	484	219	137	162
MEAN +	2441	978	622	465	382	2849	1543	453	1070	367	219	233
CFSM +	2.55	1.02	.65	.49	.40	2.98	1.61	.47	1.12	.38	.23	.24
IN +	2.94	1.14	.75	.56	.42	3.44	1.80	.55	1.25	.44	.26	.27

CAL YR 1981 TOTAL 375084 MEAN 1028 MAX 8430 MIN 126 MEAN + 1026 CFSM + 1.07 IN + 14.57
WTR YR 1982 TOTAL 355751 MEAN 975 MAX 8430 MIN 137 MEAN + 974 CFSM + 1.02 IN + 13.82

+ Adjusted for change in contents in Holloway Reservoir.

04148720 BRENT RUN NEAR MONTROSE, MI

LOCATION.--Lat 43°10'12", long 83°50'03", in SE¼ NE¼ sec.23, T.9 N., R.5 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft (3 m) downstream from bridge on Morrish Road, 0.8 mi (1.3 km) upstream from Central-Stadler Drain, 3.0 mi (4.8 km) upstream from mouth, and 3.1 mi (5.0 km) east of Montrose.

DRAINAGE AREA.--20.8 mi² (53.9 km²).

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 655 ft (200 m) from topographic map (nearest 5 ft). Prior to Aug. 26, 1970, non-recording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--12 years, 14.9 ft³/s (0.422 m³/s), 9.73 in/yr (247 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 735 ft³/s (20.8 m³/s) Oct. 1, 1981; maximum gage height, 7.20 ft (2.195 m) Mar. 13, 1982, backwater from ice; minimum discharge, 1.9 ft³/s (0.054 m³/s) Oct. 13, 1978; minimum gage height, 1.01 ft (0.308 m) Aug. 9, 17, 1971.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 250 ft³/s (7.08 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	2030	*735	20.8	6.63	2.021	Mar. 13	--	650	18.4	*a7.20	2.195

a ice jam.

Minimum discharge, 2.2 ft³/s (0.062 m³/s) Aug. 17, 18, gage height, 1.03 ft (0.314 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	384	8.0	6.1	7.5	5.2	5.8	66	6.2	44	13	3.8	4.2
2	383	6.8	8.5	9.0	5.2	5.8	21	6.0	69	8.2	4.0	4.4
3	58	6.4	7.7	12	5.2	5.8	17	5.7	13	6.7	9.4	5.2
4	28	6.2	6.4	17	5.2	5.8	19	5.6	9.0	12	4.4	4.2
5	17	7.5	5.6	80	5.2	5.8	12	5.8	7.4	9.0	4.0	3.3
6	12	9.9	5.2	30	5.2	5.8	23	8.1	6.3	5.3	3.7	3.0
7	14	11	4.7	20	5.2	5.8	14	7.2	5.6	4.7	3.5	3.0
8	9.2	7.3	4.7	15	5.2	5.8	15	14	5.3	4.4	3.8	2.8
9	7.1	6.0	4.6	10	5.2	6.5	18	7.5	5.2	4.1	5.6	2.8
10	6.4	5.3	4.5	8.0	5.2	9.0	22	6.2	6.3	4.2	3.2	2.8
11	6.1	5.3	4.4	7.0	5.2	30	18	5.9	5.7	8.5	3.2	2.8
12	5.3	5.4	4.3	6.5	5.2	100	17	6.0	4.9	7.0	3.5	2.8
13	5.2	5.3	4.1	6.0	5.2	350	17	5.8	4.7	4.7	3.2	2.4
14	5.5	5.0	4.0	5.8	5.2	450	22	5.8	4.2	3.8	3.2	2.8
15	8.6	5.2	3.9	5.6	5.3	320	13	5.6	4.6	3.8	3.0	41
16	17	4.9	4.0	5.4	5.4	210	12	5.3	16	4.4	2.6	19
17	10	4.6	4.0	5.3	5.5	110	20	4.6	7.1	12	2.5	6.5
18	9.7	4.6	4.0	5.2	5.6	64	16	4.3	5.5	73	2.8	33
19	20	4.7	4.0	5.1	5.8	46	11	5.3	24	11	2.9	21
20	10	18	4.0	5.0	6.0	37	11	5.9	36	7.6	3.5	6.3
21	8.7	53	4.2	5.0	6.2	34	12	4.7	13	5.8	11	4.5
22	26	15	5.0	5.0	6.4	30	9.5	4.7	10	4.9	5.6	4.5
23	17	8.8	5.0	5.0	6.4	26	8.1	8.7	6.9	4.5	4.0	11
24	11	7.0	5.0	5.0	6.4	24	7.4	5.9	6.0	4.2	3.8	5.9
25	9.1	6.2	5.2	5.0	6.2	22	7.0	4.9	5.4	3.7	32	5.3
26	7.7	6.6	5.4	5.0	6.0	17	6.9	4.8	5.7	3.4	41	13
27	7.6	24	5.6	5.0	6.0	13	6.9	4.7	6.5	6.7	7.9	13
28	27	15	5.5	5.1	6.0	12	6.4	5.7	5.2	23	5.4	42
29	15	8.3	5.4	5.2	---	10	6.2	19	67	10	4.5	9.0
30	10	6.5	5.5	5.2	---	15	6.1	32	40	4.9	7.0	5.9
31	8.6	---	6.0	5.2	---	110	---	35	---	4.2	6.5	---
TOTAL	1151.8	287.8	156.5	191.1	156.0	2091.9	460.4	256.9	449.5	282.7	204.5	287.3
MEAN	37.2	9.59	5.05	10.4	5.57	67.5	15.3	8.29	15.0	9.12	6.60	9.58
MAX	384	53	8.5	80	6.4	450	66	35	69	73	41	42
MIN	5.2	4.6	3.9	5.0	5.2	5.8	6.1	4.3	4.2	3.4	2.5	2.4
CFSM	1.79	.46	.24	.50	.27	3.25	.74	.40	.72	.44	.32	.46
IN.	2.06	.51	.28	.57	.28	3.74	.82	.46	.80	.51	.37	.51

CAL YR 1981 TOTAL 6663.9 MEAN 18.3 MAX 460 MIN 2.7 CFSM .88 IN 11.92
WTR YR 1982 TOTAL 6186.4 MEAN 16.7 MAX 450 MIN 2.4 CFSM .80 IN 10.92

04149000 FLINT RIVER NEAR FOSTERS, MI

LOCATION.--Lat 43°18'30", long 83°57'13", in SE¼ SE¼ sec.35, T.11 N., R.4 E., Saginaw County, Hydrologic Unit 04080204, on left bank 20 ft (6 m) downstream from bridge on State Highway 13, 2 mi (3 km) west of Fosters and 6.5 mi (10.5 km) downstream from Silver Creek. Records include flow of Birch Run.

DRAINAGE AREA.--1,188 mi² (3,077 km²), includes that of Birch Run above State Highway 13.

PERIOD OF RECORD.--October 1939 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height records for flood seasons collected in this vicinity 1910-20, 1922-27 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 954: 1941. WSP 1337: 1940, 1942, 1943-44(M), 1945, 1946-47(M), 1948-50. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 600 ft (183 m), from topographic map. Prior to Oct. 1, 1969, nonrecording gage at site 2.2 mi (3.5 km) upstream at datum 582.22 ft (177.461 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records fair. Some regulation by reservoirs above Flint. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--43 years, 739 ft³/s (20.93 m³/s), 8.45 in/yr (215 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 19,000 ft³/s (538 m³/s) Apr. 7, 1947 (including flow bypassing gage); maximum gage height, 18.6 ft (5.67 m) Feb. 2, 1968, site and datum then in use; minimum discharge observed, 27 ft³/s (0.76 m³/s) Aug. 6, 1941.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of March 1904, reached a stage of 18.4 ft (5.61 m) from U.S. Weather Bureau data, site and datum then in use.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 9,350 ft³/s (265 m³/s) Oct. 2; maximum gage height, 16.35 ft (4.983 m) Oct. 1; minimum daily discharge, 197 ft³/s (5.579 m³/s) Aug. 17; minimum gage height, 2.05 ft (0.625 m) Aug. 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4500	1480	1300	540	340	560	3800	469	1450	784	298	270
2	9350	1430	1350	620	420	570	3700	463	2430	702	310	250
3	7340	1360	1310	560	530	580	3100	452	2070	613	400	250
4	6390	1280	1220	600	480	540	3400	447	2350	615	317	240
5	6050	1270	1130	1100	470	540	3400	444	2180	577	304	220
6	5850	1310	1070	1100	450	540	3300	447	1960	519	293	210
7	5580	1300	1020	1000	450	500	2900	459	1530	469	283	220
8	4330	1210	1010	980	420	490	3000	562	1170	449	280	230
9	3230	1170	1030	880	440	480	2500	470	1080	435	298	220
10	2460	902	964	760	440	500	1900	469	1020	392	261	210
11	2220	644	964	700	430	570	1950	573	879	508	242	210
12	2040	737	914	660	435	900	1950	595	704	458	228	200
13	1830	779	894	660	440	1450	2000	598	654	404	224	200
14	1570	770	857	600	440	7400	2200	570	595	381	219	220
15	1610	764	716	580	445	8200	2100	507	564	510	212	330
16	1590	743	597	540	480	6800	1950	461	721	357	200	380
17	1480	737	559	480	520	7200	2100	435	658	529	197	260
18	1430	716	525	470	490	8200	2300	411	575	1090	203	240
19	1460	689	490	340	490	8500	2250	384	811	595	207	640
20	1280	932	500	370	510	7200	2000	357	1110	479	244	310
21	872	1520	520	400	520	6200	1600	371	955	445	356	260
22	1130	1290	520	500	520	5100	1300	370	956	405	271	250
23	1240	1150	540	470	570	4400	1150	419	891	379	235	330
24	1240	1110	560	470	400	4100	1100	372	831	347	231	300
25	1160	1100	560	440	590	3900	1050	375	802	318	720	280
26	1120	1130	540	430	580	3700	980	396	794	301	951	340
27	1130	1350	520	430	560	3400	920	415	753	297	360	320
28	1820	1460	500	420	540	3100	584	445	654	439	280	520
29	1720	1340	500	420	---	2600	493	772	1660	478	250	440
30	1550	1280	500	400	---	1880	474	699	1630	356	250	370
31	1620	---	520	350	---	3040	---	704	---	322	320	---
TOTAL	86212	32953	24200	18270	13400	103140	61451	14911	34437	14953	9444	8720
MEAN	2781	1098	781	589	486	3327	2048	481	1148	482	305	291
MAX	9350	1520	1350	1100	600	8500	3800	772	2430	1090	951	640
MIN	872	644	490	340	340	480	474	357	564	297	197	200

CAL YR 1981 TOTAL 428235 MEAN 1173 MAX 9350 MIN 191
WTR YR 1982 TOTAL 422291 MEAN 1157 MAX 9350 MIN 197

04149500 FLINT RIVER NEAR ALICIA, MI

LOCATION.--Lat 43°18'40", long 84°02'00", in SE¼ sec.31, T.11 N., R.4 E., Saginaw County, Hydrologic Unit 04080204, on left bank 100 ft (30 m) downstream from the Prairie Farms Association flood-pumping station, 2.8 mi (4.5 km) north of Alicia, and 4 mi (6 km) upstream from mouth.

PERIOD OF RECORD.--November 1948 to current year (gage heights only).

GAGE.--Water-stage recorder. Datum of gage is 577.00 ft (175.870 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Records represent stages in the Shiawassee Flats area.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 13.70 ft (4.176 m) Apr. 3, 1960; minimum, less than 1.5 ft (0.46 m) during many days in 1949, 1958, 1959, 1963, 1964, 1966-69.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 12.60 ft (3.840 m) Mar. 16; minimum, 2.22 ft (0.677 m) July 11.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.48	---	5.11	3.24	3.19	3.51	8.71	3.55	4.69	4.11	3.57	3.41
2	11.36	---	4.81	3.59	2.91	3.68	8.81	3.55	5.69	3.68	3.96	3.46
3	12.07	---	4.86	3.27	2.91	3.73	8.52	3.51	6.07	3.93	3.73	3.45
4	11.90	---	4.92	4.07	---	3.63	7.92	3.48	6.07	3.91	3.79	3.61
5	11.30	---	4.68	4.41	---	3.34	7.71	3.20	5.69	3.59	4.02	3.19
6	10.58	---	4.30	4.57	---	3.50	7.55	3.13	5.20	3.31	3.87	3.94
7	9.97	---	3.97	4.61	---	3.51	6.96	3.36	4.62	3.24	3.72	3.97
8	9.37	---	4.47	4.27	---	3.49	6.40	3.61	4.19	3.75	3.42	3.49
9	8.67	---	4.60	4.18	---	3.41	6.00	3.67	4.20	3.58	3.41	3.36
10	7.88	---	4.56	4.09	---	3.43	5.68	3.46	3.81	3.52	3.84	3.39
11	7.18	---	4.33	4.02	---	3.52	5.64	3.18	3.87	2.72	3.83	3.24
12	6.65	---	4.43	3.98	---	4.22	5.67	3.64	3.61	3.41	3.76	3.36
13	6.10	---	4.00	3.91	---	7.95	5.77	3.92	3.67	3.70	3.64	3.30
14	5.53	---	3.68	3.79	---	11.04	6.06	3.63	3.63	3.49	3.60	3.67
15	5.26	---	3.58	3.66	---	12.08	5.88	3.48	3.50	3.55	3.60	4.14
16	5.33	---	3.58	3.64	3.33	12.56	5.55	3.57	4.06	3.43	3.49	3.61
17	5.02	---	3.81	3.64	3.38	12.56	5.45	3.73	4.02	3.41	3.85	3.25
18	4.25	3.74	3.48	3.63	3.38	12.46	5.48	3.31	4.34	3.94	3.63	3.57
19	4.73	4.08	3.56	3.62	3.39	12.19	5.35	3.21	4.40	3.99	2.95	3.52
20	4.52	5.50	3.40	3.57	3.46	11.80	5.31	3.71	4.59	4.02	3.78	3.16
21	4.85	4.85	2.94	3.54	3.47	11.29	4.77	4.36	4.85	3.81	4.00	3.50
22	4.65	4.51	3.33	3.51	3.51	10.81	4.70	4.00	5.04	3.73	3.02	4.09
23	4.61	4.25	3.50	3.29	3.67	10.32	4.23	3.84	4.92	4.00	3.63	3.59
24	4.68	4.34	3.22	3.07	3.93	9.79	4.00	3.67	4.52	3.70	3.78	3.21
25	4.34	4.20	3.40	3.13	3.71	9.36	3.89	3.54	4.10	3.46	4.13	3.36
26	4.67	4.14	3.59	3.12	3.59	9.00	3.87	3.56	4.42	3.73	3.63	3.41
27	4.59	4.20	3.32	3.12	3.61	8.55	4.31	3.72	4.06	3.80	3.61	3.71
28	4.90	5.17	3.27	2.96	3.62	7.85	3.94	3.73	3.82	3.98	3.83	3.73
29	4.88	5.43	3.51	2.90	---	7.00	3.74	3.95	4.40	3.86	3.56	3.33
30	---	5.23	3.36	2.91	---	6.32	3.65	4.13	4.71	3.50	3.38	3.20
31	---	---	3.35	3.18	---	7.60	---	4.14	---	3.73	3.98	---
MEAN	---	---	3.90	3.63	---	7.53	5.72	3.63	4.49	3.66	3.68	3.51
MAX	---	---	5.11	4.61	---	12.56	8.81	4.36	6.07	4.11	4.13	4.14
MIN	---	---	2.94	2.90	---	3.34	3.65	3.13	3.50	2.72	2.95	3.16

04150500 CASS RIVER AT CASS CITY, MI

LOCATION.--Lat 43°35'03", long 83°10'34", in NE¼ NE¼ sec.4, T.13 N., R.11 E., Tuscola County, Hydrologic Unit 04080205, on left bank 600 ft (183 m) downstream from bridge on Cemetary Road, 0.3 mi (0.5 km) downstream from confluence of North and South Branches, and 1.1 mi (1.8 km) south of Cass City.

DRAINAGE AREA.--359 mi² (930 km²).

PERIOD OF RECORD.--October 1947 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1337: 1949-50. WSP 1727: 1948(M), 1950. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 697.92 ft (212.726 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 14, 1952, nonrecording gage at site 600 ft (183 m) upstream at present datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 203 ft³/s (5.749 m³/s), 7.68 in/yr (195 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,460 ft³/s (240 m³/s) Mar. 20, 1948, gage height, 15.80 ft (4.816 m), from graph based on gage readings; minimum, 0.50 ft³/s (0.014 m³/s) Sept. 26, 1948.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,400 ft³/s (39.6 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 2	0900	3640	103	12.10	3.688	Mar. 31	1900	*5030	142	*13.22	4.029
Oct. 7	0500	1500	42.5	8.99	2.740	June 2	0600	2280	64.6	10.31	3.142
Mar. 15	--	4520	128	ice jam							

Minimum discharge, 8.5 ft³/s (0.24 m³/s) Sept. 15, 17; minimum gage height, 4.60 ft (1.402 m) Sept. 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1460	182	368	100	83	70	3410	88	677	118	31	18
2	3540	167	385	100	82	70	1860	83	2010	90	30	24
3	2770	154	470	100	81	70	1260	77	766	75	28	48
4	1420	141	432	100	80	70	946	74	349	67	29	40
5	883	134	387	100	79	70	615	69	235	64	25	29
6	975	186	329	100	78	70	436	68	181	59	24	23
7	1370	364	287	100	77	70	391	74	145	51	24	19
8	795	280	277	100	77	70	400	100	123	45	25	16
9	542	198	243	100	76	70	539	109	107	40	24	14
10	442	164	230	100	76	70	686	98	109	37	22	13
11	362	145	210	100	75	120	556	93	97	36	20	13
12	289	132	190	100	75	250	500	87	82	35	18	11
13	239	119	176	100	74	600	567	84	71	33	16	11
14	202	110	164	100	74	2700	706	84	62	31	15	9.9
15	213	102	160	100	74	3600	487	83	71	31	15	9.0
16	329	98	152	100	73	4150	400	84	205	30	15	9.3
17	326	93	148	100	73	4020	460	89	229	31	13	9.1
18	299	92	138	99	73	3360	418	84	181	33	11	13
19	383	90	130	98	73	2670	327	90	225	37	12	14
20	358	163	125	97	72	2150	296	103	481	32	11	17
21	288	611	120	96	72	1910	269	93	978	28	12	16
22	333	554	115	94	72	1860	224	82	889	25	12	18
23	510	386	110	93	72	2050	190	82	506	23	12	21
24	405	316	108	92	71	2190	165	88	359	22	12	23
25	304	249	105	90	71	1980	145	96	279	21	24	24
26	254	223	102	89	71	1480	132	105	275	19	40	22
27	225	538	100	88	71	978	122	97	215	23	37	23
28	239	698	100	87	70	773	111	97	170	37	28	28
29	291	542	100	86	---	628	101	140	416	46	23	32
30	242	451	100	85	---	788	94	134	193	38	21	29
31	202	---	100	84	---	3990	---	140	---	33	19	---
TOTAL	20490	7682	6161	2978	2095	42947	16813	2875	10686	1290	648	596.3
MEAN	661	256	199	96.1	74.8	1385	560	92.7	356	41.6	20.9	19.9
MAX	3540	698	470	100	83	4150	3410	140	2010	118	40	48
MIN	202	90	100	84	70	70	94	68	62	19	11	9.0
CFSM	1.84	.71	.55	.27	.21	3.86	1.56	.26	.99	.12	.06	.06
IN.	2.12	.80	.64	.31	.22	4.45	1.74	.30	1.11	.13	.07	.06

CAL YR 1981 TOTAL 125519.0 MEAN 344 MAX 4230 MIN 11 CFSM .96 IN 13.01
WTR YR 1982 TOTAL 115261.3 MEAN 316 MAX 4150 MIN 9.0 CFSM .88 IN 11.94

04150800 CASS RIVER AT WAHJAMEGA, MI

LOCATION.--Lat 43°27'02", long 83°26'29", in NW¼ NW¼ sec.20, T.12 N., R.9 E., Tuscola County, Hydrologic Unit 04080205, on right bank 90 ft (27 m) upstream from bridge on Chambers Road, on grounds of Caro Regional Center at Wahjamega, 1.9 mi (3.1 km) downstream from Michigan Sugar Co. dam, and 40 mi (64 km) upstream from mouth.

DRAINAGE AREA.--645 mi² (1,671 km²).

PERIOD OF RECORD.--October 1968 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 650 ft (198 m) from topographic map. Prior to June 19, 1969, nonrecording gage at bridge 90 ft (27 m) downstream at present datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, July 10 to Aug. 11, which are poor. Some regulation by dam at Michigan Sugar Co., 1.9 mi (3.1 km) above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--14 years, 407 ft³/s (11.53 m³/s), 8.57 in/yr (218 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,700 ft³/s (331 m³/s) Mar. 6, 1976, gage height, 19.92 ft (6.072 m); minimum, 20 ft³/s (0.57 m³/s) Oct. 2, 3, 1979.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 2,400 ft³/s (68.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 2	2200	6460	183	15.73	4.795	Mar. 24	1900	3370	95.4	11.45	3.490
Oct. 7	1200	2730	77.3	10.30	3.139	Apr. 1	0500	*7750	219	*16.98	5.176
Mar. 16	0100	6720	190	16.04	4.889	June 2	1900	3060	86.7	10.89	3.319

Minimum discharge, 32 ft³/s (0.91 m³/s) Sept. 16; minimum gage height, 2.96 ft (0.902 m) Sept. 16, 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2280	432	746	180	162	190	6720	241	520	293	70	57
2	5550	402	783	180	162	190	3540	230	2440	220	70	60
3	5660	377	816	180	160	190	2260	220	2000	186	82	76
4	3440	356	711	180	160	190	1760	213	779	172	98	95
5	1900	341	622	180	160	190	1150	206	488	158	90	81
6	1700	361	542	180	160	190	884	202	366	147	80	69
7	2610	539	478	180	160	190	715	205	293	133	74	57
8	1920	601	455	180	160	190	806	233	247	120	72	49
9	1190	464	431	180	160	190	953	256	217	101	70	44
10	928	383	334	180	160	190	1210	244	232	95	63	41
11	779	350	305	180	160	190	1110	224	221	90	54	39
12	657	324	300	180	162	230	959	213	190	85	49	38
13	565	303	280	180	162	1660	986	197	169	80	45	36
14	496	285	260	180	163	3730	1310	185	151	76	43	35
15	515	272	250	180	164	5700	1040	178	155	70	41	34
16	668	264	235	180	166	6610	843	171	275	65	41	33
17	745	258	220	179	170	6290	1040	165	431	68	39	33
18	685	250	210	178	172	5410	1000	157	355	112	38	45
19	773	248	200	178	174	4480	775	163	416	105	37	48
20	774	314	200	176	176	3740	681	183	792	90	36	48
21	663	888	195	175	178	3150	640	187	1480	75	36	50
22	671	1130	190	172	180	2980	538	169	1910	67	36	52
23	932	821	190	170	180	3150	459	163	1110	60	36	59
24	884	656	185	170	182	3340	406	169	710	55	38	63
25	700	550	182	170	185	3160	364	174	533	52	98	66
26	592	499	180	168	188	2520	336	174	477	50	96	68
27	534	968	180	168	190	1640	308	179	418	51	96	93
28	506	1410	180	166	190	1260	283	216	330	55	86	104
29	564	1090	180	166	---	1070	262	331	450	64	71	97
30	552	878	180	165	---	1200	249	370	541	71	68	93
31	480	---	180	164	---	4840	---	264	---	73	60	---
TOTAL	40913	16014	10400	5445	4746	68250	33587	6482	18696	3139	1913	1763
MEAN	1320	534	335	176	170	2202	1120	209	623	101	61.7	58.8
MAX	5660	1410	816	180	190	6610	6720	370	2440	293	98	104
MIN	480	248	180	164	160	190	249	157	151	50	36	33
CFSM	2.05	.83	.52	.27	.26	3.41	1.74	.32	.97	.16	.10	.09
IN.	2.36	.92	.60	.31	.27	3.94	1.94	.37	1.08	.18	.11	.10

CAL YR 1981 TOTAL 239539 MEAN 656 MAX 7890 MIN 38 CFSM 1.02 IN 13.82
WTR YR 1982 TOTAL 211348 MEAN 579 MAX 6720 MIN 33 CFSM .90 IN 12.19

04151500 CASS RIVER AT FRANKENMUTH, MI

LOCATION.--Lat 43°19'40", long 83°44'53", in NW¼ SE¼ sec.27, T.11 N., R.6 E., Saginaw County, Hydrologic Unit 04080205, on right bank 2,000 ft (610 m) below dam in Frankenmuth, 3,600 ft (1,097 m) above highway bridge on Dehmel Road, 3.4 mi (5.5 km) upstream from Dead Creek, and 17 mi (27 km) upstream from mouth.

DRAINAGE AREA.--841 mi² (2,178 km²).

PERIOD OF RECORD.--February 1908 to March 1909, July 1935 to September 1936, June 1939 to current year.

REVISED RECORDS.--WSP 1307: 1936(M), 1940(M). WSP 1727: 1952. WSP 1911: 1952. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 583.96 ft (177.991 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). February 1908 to March 1909, nonrecording gage at site 2,000 ft (610 m) upstream at datum 1.81 ft (0.552 m) lower. July 18 to Sept. 11, 1935, nonrecording gage, Sept. 12, 1935, to Sept. 30, 1936, and June 20, 1939, to Sept. 30, 1949, water-stage recorder, at site 3,600 ft (1,097 m) downstream at datum 0.04 ft (0.012 m) higher.

REMARKS.--Records good except those for the winter period, which are poor. Occasional regulation by dams above station. Prior to 1950, regulation at low and medium flows by mill above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--44 years, 483 ft³/s (13.68 m³/s), 7.80 in/yr (198 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 17,700 ft³/s (501 m³/s) Mar. 18, 1942, gage height, 20.88 ft (6.364 m), site and datum then in use; maximum gage height, 23.37 ft (7.123 m) Feb. 3, 1968, backwater from ice; minimum daily discharge, about 1.5 ft³/s (0.042 m³/s) Aug. 6, 1944.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,500 ft³/s (99.1 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 3	0900	6,420	182	18.63	5.678	Mar. 17	--	*8,860	251	ice jam	--
Mar. 16	--	ice jam	--	*20.96	6.389	Apr. 1	1600	7,900	224	18.79	5.727

Minimum discharge, 57 ft³/s (1.61 m³/s) Aug. 19, Sept. 17, gage height, 3.47 ft (1.058 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3870	570	930	235	210	238	7440	319	463	436	100	92
2	5570	534	867	235	210	238	5340	304	1540	301	102	95
3	6250	496	956	235	210	240	2990	291	2510	243	107	96
4	4720	444	873	232	210	240	2550	278	1180	221	124	104
5	2630	393	759	232	210	240	1600	264	644	205	114	112
6	1930	405	666	230	210	240	1210	261	464	187	104	105
7	2490	498	595	230	210	240	994	264	368	171	92	95
8	2380	665	563	230	210	240	1020	288	308	156	94	88
9	1580	599	544	230	210	240	1170	312	273	145	94	79
10	1190	491	410	230	212	245	1410	317	273	132	93	73
11	989	439	360	230	212	260	1460	290	279	128	85	69
12	848	402	370	228	215	350	1270	273	240	129	79	65
13	737	377	350	228	215	2500	1250	257	211	122	73	61
14	664	359	335	226	215	4100	1510	243	188	112	68	62
15	676	345	320	225	218	6000	1440	226	190	106	66	63
16	815	336	300	225	218	8200	1140	218	286	102	64	58
17	929	330	270	222	220	8500	1420	208	427	123	62	59
18	889	324	250	220	220	7300	1450	198	437	148	61	72
19	928	316	248	220	222	5950	1140	202	509	137	59	78
20	968	389	245	218	225	4770	962	214	814	131	72	80
21	881	810	245	218	230	3970	878	222	1320	119	71	82
22	869	1270	245	215	232	3550	744	220	2120	107	60	83
23	1040	1100	245	215	234	3500	635	211	1600	99	60	89
24	1140	840	245	212	236	3720	557	211	985	91	63	94
25	951	697	242	210	238	3670	497	220	689	84	123	95
26	790	619	242	210	238	3100	451	217	563	84	162	94
27	714	960	240	210	238	2170	417	218	512	85	132	115
28	670	1560	240	210	238	1590	382	220	423	92	122	152
29	663	1390	240	210	---	1340	358	351	375	102	111	141
30	696	1100	238	210	---	1530	333	420	650	107	104	127
31	629	---	236	210	---	4690	---	368	---	106	101	---
TOTAL	50096	19058	12869	6891	6166	83251	44018	8105	20842	4511	2822	2678
MEAN	1616	635	415	222	220	2686	1467	261	695	146	91.0	89.3
MAX	6250	1560	956	235	238	8500	7440	420	2510	436	162	152
MIN	629	316	236	210	210	238	333	198	188	84	59	58
CFSM	1.92	.76	.49	.26	.26	3.19	1.74	.31	.83	.17	.11	.11
IN.	2.22	.84	.57	.30	.27	3.68	1.95	.36	.92	.20	.12	.12

CAL YR 1981 TOTAL 297023 MEAN 814 MAX 8000 MIN 66 CFSM .97 IN 13.14
WTR YR 1982 TOTAL 261307 MEAN 716 MAX 8500 MIN 58 CFSM .85 IN 11.56

04152500 TOBACCO RIVER AT BEAVERTON, MI

LOCATION.--Lat 43°52'43", long 84°28'18", in NW¼ SE¼ sec.7, T.17 N., R.1 W., Gladwin County, Hydrologic Unit 04080201, on left bank 15 ft (5 m) downstream from bridge on Glidden Road, 1.0 mi (1.6 km) downstream from dam in Beaverton, and 2.0 mi (3.2 km) upstream from Venison Creek.

DRAINAGE AREA.--487 mi² (1,261 km²).

PERIOD OF RECORD.--July 1948 to September 1982 (discontinued).

REVISED RECORDS.--WSP 1307: 1948(M).

GAGE.--Water-stage recorder. Datum of gage is 683.27 ft (208.261 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are poor. Prior to Feb. 21, 1961, regulation at all stages by hydroelectric powerplant 1.0 mi (1.6 km) above station; occasional regulation since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--34 years, 376 ft³/s (10.65 m³/s), 10.48 in/yr (266 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,680 ft³/s (217 m³/s) July 9, 1957, gage height, 12.95 ft (3.947 m); minimum, 5.6 ft³/s (0.16 m³/s) July 12, 13, 14, 1959, Aug. 21, 1961; minimum daily, 5.9 ft³/s (0.17 m³/s) July 12, 13, 1959.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,040 ft³/s (57.8 m³/s) Mar. 25, gage height, 6.74 ft (2.054 m); minimum, 11 ft³/s (0.31 m³/s) Sept. 30, gage height, 0.59 ft (0.180 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	480	222	462	246	250	261	1790	305	1100	278	208	191
2	599	236	468	284	250	285	1380	281	1480	256	185	205
3	363	236	505	202	250	333	1420	234	747	244	165	244
4	278	220	478	328	250	313	1740	229	442	237	174	213
5	286	216	402	312	250	241	1300	269	408	234	185	204
6	441	234	355	288	250	290	838	284	365	216	187	195
7	325	242	335	343	250	278	605	296	337	212	185	553
8	428	234	270	313	250	239	617	313	260	211	182	535
9	312	220	293	373	250	143	622	310	220	198	178	246
10	262	212	253	322	250	162	608	295	246	195	169	200
11	258	208	220	365	250	196	591	284	307	219	164	182
12	254	208	285	302	250	269	522	268	299	201	162	179
13	252	204	262	270	250	459	519	260	273	190	160	179
14	248	202	251	270	250	734	616	258	255	188	158	184
15	248	202	247	270	250	846	653	249	423	200	157	204
16	254	202	242	270	250	1010	642	242	953	198	157	283
17	269	238	208	280	250	1060	820	242	764	192	156	222
18	398	222	169	290	250	1140	863	259	560	278	153	215
19	603	206	169	290	250	1140	731	258	1180	512	152	219
20	429	218	208	290	250	1210	700	247	1310	474	152	207
21	360	240	214	295	248	1140	860	238	1070	259	155	206
22	352	253	222	295	250	1050	785	228	855	183	160	222
23	232	251	236	295	256	1400	543	249	505	177	156	211
24	185	240	230	295	270	1920	463	423	476	180	169	202
25	222	228	218	290	319	2020	431	587	434	186	235	203
26	364	236	210	280	302	1700	425	381	473	199	269	213
27	291	673	228	270	294	927	378	422	494	280	202	215
28	216	995	234	265	268	811	364	1260	391	288	177	208
29	218	750	230	260	---	789	362	1520	339	295	177	198
30	219	558	226	260	---	970	341	883	298	240	180	86
31	222	---	228	255	---	1800	---	584	---	214	236	---
TOTAL	9877	8806	8548	8968	7207	25166	22529	12158	17264	7434	5505	6824
MEAN	319	294	276	289	257	812	751	392	575	240	178	227
MAX	603	995	505	373	319	2020	1790	1520	1480	512	269	553
MIN	185	202	169	202	248	162	341	228	220	177	152	86
CFSM	.66	.60	.57	.59	.53	1.67	1.54	.81	1.18	.49	.37	.47
IN.	.75	.67	.65	.69	.55	1.92	1.72	.93	1.32	.57	.42	.52

CAL YR 1981 TOTAL 128025 MEAN 351 MAX 2450 MIN 139 CFSM .72 IN 9.78
WTR YR 1982 TOTAL 140286 MEAN 384 MAX 2020 MIN 86 CFSM .79 IN 10.72

04154000 CHIPPEWA RIVER NEAR MOUNT PLEASANT, MI

LOCATION.--Lat 43°37'32", long 84°42'28", in NW¼ NW¼ sec.8, T.14 N., R.3 W., Isabella County, Hydrologic Unit 04080202, on right bank 12 ft (4 m) downstream from bridge on South Leaton Road, 3.8 mi (6.1 km) northeast of Mount Pleasant, and 36 mi (58 mi) upstream from mouth.

DRAINAGE AREA.--416 mi² (1,077 km²).

PERIOD OF RECORD.--October 1930 to September 1931, October 1932 to current year. Monthly discharge only for some periods published in WSP 1307. Gage-height records for flood seasons collected in this vicinity 1910-27, are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 744: Drainage area. WSP 1337: 1931, 1933-40, 1945, 1948-49.

GAGE.--Water-stage recorder. Datum of gage is 710.38 ft (216.524 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Oct. 21, 1938, nonrecording gage at site 30 ft (9 m) upstream at present datum.

REMARKS.--Records good except those for the winter period and those for the period of no gage-height record, July 5 to Aug. 9, which are poor. Diurnal fluctuation below 750 ft³/s (21.2 m³/s) caused by powerplant at Mount Pleasant prior to 1962, occasional regulation at low flow since. Since July 30, 1968, occasional regulation by control structures on lake outlets. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--51 years, 306 ft³/s (8.666 m³/s), 9.99 in/yr (254 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,960 ft³/s (140 m³/s) Mar. 8, 1946, gage height, 12.78 ft (3.895 m); minimum, 12 ft³/s (0.34 m³/s) Aug. 18, 1945; minimum daily, 19 ft³/s (0.54 m³/s) Aug. 16, 1936; minimum gage height, 2.70 ft (0.823 m) Oct. 8, 1966.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,000 ft³/s (28.3 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 15	1000	1,170	33.1	6.15	1.875	June 2	0400	*1,280	36.2	*6.41	1.954
Mar. 24	1600	1,090	30.9	5.91	1.801	June 16	1800	1,250	35.4	6.38	1.945
Apr. 4	0800	1,260	35.7	6.40	1.951	June 20	0300	1,100	31.2	5.95	1.814
May 30	2300	1,230	34.8	6.28	1.914						

Minimum discharge recorded, 169 ft³/s (4.79 m³/s) Aug. 18-21, gage height, 3.01 ft (0.917 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	588	237	521	225	250	250	973	375	935	306	220	430
2	788	231	540	230	250	250	956	358	1110	285	220	350
3	588	233	515	235	250	250	1030	339	694	270	210	300
4	492	229	464	240	250	250	1220	329	512	263	210	260
5	411	227	434	255	250	250	1050	308	426	250	205	250
6	411	228	403	275	250	250	939	300	368	240	200	225
7	477	228	372	285	250	250	844	310	324	235	200	220
8	420	224	354	290	250	250	768	309	291	230	200	210
9	390	221	327	295	250	250	721	295	272	220	195	200
10	360	214	310	295	250	250	696	285	381	215	194	195
11	336	210	318	290	250	250	649	275	348	220	188	195
12	315	204	259	290	250	300	617	260	304	215	183	200
13	291	200	291	290	250	450	608	255	286	210	177	210
14	280	197	272	290	250	800	617	252	263	205	173	220
15	336	193	264	285	250	1120	596	248	327	200	175	200
16	339	193	253	280	250	1120	597	245	1040	195	174	190
17	318	192	246	275	250	1070	696	244	872	195	173	188
18	441	190	250	270	250	1120	715	243	634	250	171	201
19	526	189	250	265	250	1080	730	242	800	440	170	197
20	452	203	250	260	250	998	766	240	970	400	170	198
21	412	234	250	255	250	917	764	230	758	280	170	200
22	401	228	245	255	250	920	694	237	751	210	170	206
23	370	225	240	250	250	981	657	262	595	175	175	196
24	339	221	240	250	250	1040	606	285	491	175	180	191
25	315	215	240	250	250	1060	552	286	434	180	185	188
26	301	219	235	250	250	1000	498	285	464	190	185	199
27	291	556	229	250	250	920	464	311	419	230	180	194
28	280	826	228	250	250	820	437	505	429	250	185	191
29	271	673	224	250	---	690	422	476	381	250	200	189
30	262	597	222	250	---	750	397	873	339	235	280	186
31	256	---	225	250	---	953	---	885	---	225	480	---
TOTAL	12057	8237	9471	8180	7000	20859	21279	10347	16218	7444	6198	6579
MEAN	380	275	306	264	250	673	709	334	541	240	200	219
MAX	788	826	540	295	250	1120	1220	885	1110	440	480	430
MIN	256	189	222	225	250	250	397	230	263	175	170	186
CFSM	.94	.66	.74	.64	.60	1.62	1.70	.80	1.30	.58	.48	.53
IN.	1.08	.74	.85	.73	.63	1.87	1.90	.93	1.45	.67	.55	.59

CAL YR 1981 TOTAL 116189 MEAN 318 MAX 2320 MIN 125 CFSM .76 IN 10.39
WTR YR 1982 TOTAL 133869 MEAN 367 MAX 1220 MIN 170 CFSM .88 IN 11.97

04155000 PINE RIVER AT ALMA, MI

LOCATION.--Lat 43°22'46", long 84°39'20", in SW¼ SE¼ sec.34, T.12 N., R.3 W., Gratiot County, Hydrologic Unit 04080202, on right bank 270 ft (32 m) downstream from Superior Street Bridge in Alma, 0.6 mi (1.0 km) downstream from municipal reservoir, and 38 mi (61 km) upstream from mouth.

DRAINAGE AREA.--288 mi² (746 km²).

PERIOD OF RECORD.--October 1930 to current year. Gage-height records for flood seasons collected in this vicinity 1910-28 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 744: Drainage area. WSP 1307: 1945(M). WSP 1337: 1931, 1932-34(M), 1936, 1939, 1945, 1949.

GAGE.--Water-stage recorder. Datum of gage is 718.37 ft (218.959 m) National Geodetic Vertical Datum of 1929. Prior to Dec. 10, 1930, nonrecording gage at Superior Street Bridge at different datum. Dec. 10, 1930, to June 15, 1938, nonrecording gage at site 70 ft (21 m) downstream from bridge and June 16 to Oct. 25, 1938, nonrecording gage at bridge at present datum.

REMARKS.--Records fair except those for the winter period, and those for period of no gage-height record, Jan. 8 to Feb. 16, which are poor. Occasional regulation caused by dam 0.6 mi (1.0 km) above station and by variable backwater from powerplant at St. Louis, 5.2 mi (8.4 km) below station. About 3.4 ft³/s (0.10 m³/s) diverted above station for municipal and industrial use; sewage effluent is returned below station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--52 years, 213 ft³/s (6.032 m³/s), 10.04 in/yr (255 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,400 ft³/s (125 m³/s) Mar. 19, 1948, gage height, 10.81 ft (3.295 m); minimum daily, 0.40 ft³/s (0.011 m³/s) Sept. 6, 1964, caused by closing dam during construction of waterworks.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,820 ft³/s (51.5 m³/s) Mar. 16, gage height, 7.23 ft (2.204 m); minimum, 45 ft³/s (1.27 m³/s) Aug. 20, gage height, 0.83 ft (0.253 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1160	253	515	180	150	175	666	210	435	259	120	92
2	1100	247	493	180	150	165	658	216	490	230	115	91
3	994	247	443	175	150	160	737	216	564	198	164	104
4	940	244	407	175	150	150	704	187	561	188	189	121
5	868	242	394	172	150	140	626	185	517	170	136	143
6	775	229	378	170	150	130	582	172	399	166	118	155
7	670	226	367	165	150	150	572	171	323	147	82	130
8	543	225	341	162	150	200	522	173	285	133	128	93
9	495	223	311	160	150	160	498	217	244	126	143	82
10	466	218	297	155	150	170	498	189	303	126	96	75
11	431	215	235	152	150	160	478	175	294	151	91	72
12	390	211	230	150	150	180	474	152	298	123	95	76
13	348	194	225	150	150	600	482	152	316	99	95	83
14	315	189	220	150	150	1320	462	156	290	100	75	93
15	293	186	215	150	155	1490	430	148	274	101	52	95
16	303	184	210	150	155	1720	424	138	353	86	54	124
17	305	199	205	150	165	1750	428	134	354	90	60	158
18	339	197	205	150	170	1690	401	153	387	117	63	169
19	357	177	202	150	180	1510	396	140	464	130	61	171
20	360	208	200	150	185	1270	426	134	499	149	53	173
21	376	229	200	150	190	1100	413	126	493	215	49	163
22	399	256	200	150	190	987	380	126	479	253	60	172
23	398	273	200	150	190	915	358	182	449	287	64	178
24	366	270	198	150	190	875	330	211	411	324	58	179
25	347	252	197	150	190	832	305	239	386	270	87	148
26	345	262	197	150	185	780	288	236	336	181	82	141
27	324	450	195	150	180	721	264	230	309	187	75	130
28	303	451	195	150	180	641	253	218	297	201	67	125
29	304	436	198	150	---	592	236	243	277	185	75	137
30	272	481	185	150	---	570	224	318	257	164	85	143
31	261	---	185	150	---	718	---	339	---	114	83	---
TOTAL	15139	7674	8235	4846	4685	22041	13515	5886	11344	5270	2775	3816
MEAN	488	256	266	156	164	711	451	190	378	170	89.5	127
MAX	1160	481	515	180	190	1750	737	339	564	324	189	179
MIN	261	177	185	150	150	130	224	126	244	86	49	72
CFSM	1.69	.89	.92	.54	.57	2.47	1.57	.66	1.31	.59	.31	.44
IN.	1.96	.99	1.06	.63	.59	2.85	1.75	.76	1.47	.68	.36	.49

CAL YR 1981 TOTAL 89305 MEAN 245 MAX 1220 MIN 41 CFSM .85 IN 11.54
WTR YR 1982 TOTAL 105146 MEAN 288 MAX 1750 MIN 49 CFSM 1.00 IN 13.58

04155500 PINE RIVER NEAR MIDLAND, MI

LOCATION.--Lat 43°33'52", long 84°22'09", in SW¼ NW¼ sec.4, T.13 N., R.1 E., Midland County, Hydrologic Unit 04080202, on left bank at downstream side of bridge on Meridian Road, 7.2 mi (11.6 km) southwest of Midland, and 7.8 mi (12.6 km) upstream from Chippewa River.

DRAINAGE AREA.--390 mi² (1,010 km²), approximately.

PERIOD OF RECORD.--May 1934 to September 1938, February 1948 to current year.

REVISED RECORDS.--WSP 1207: Drainage area. WSP 1307: 1935(M). WSP 1337: 1936-38, 1948-49.

GAGE.--Water-stage recorder. Datum of gage is 623.94 ft (190.177 m) National Geodetic Vertical Datum of 1929. Prior to Sept. 30, 1938, nonrecording gage at same site, at datum 5.55 ft (1.692 m) lower. Feb. 3, 1948, to Dec. 13, 1951, nonrecording gage at present site and datum.

REMARKS.--Records fair except those for the winter period and those for period of no gage-height record, Dec. 18 to Mar. 15, which are poor. Regulation at low and medium flows by hydroelectric powerplant at St. Louis. Some diversion above station for irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--38 years, 296 ft³/s (8.383 m³/s), 10.31 in/yr (262 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,360 ft³/s (180 m³/s) Mar. 20, 1948, gage height, 10.00 ft (3.048 m), from graph based on gage readings; maximum gage height, 12.08 ft (3.682 m) Feb. 2, 1968, backwater from ice; minimum discharge not determined.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft³/s (34.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 2	0500	*3,730	106	7.62	2.323	Mar. 31	1200	1,530	43.3	5.24	1.597
Mar. 16	--	2,890	81.8	*a8.92	2.719						

a Ice jam.

Minimum discharge, 54 ft³/s (1.53 m³/s) Aug. 29, gage height, 2.29 ft (0.698 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1510	280	580	205	190	220	958	290	805	239	93	105
2	3230	276	670	200	190	215	812	175	873	262	119	139
3	1820	253	608	195	190	210	957	189	655	262	199	133
4	1570	250	502	195	190	205	984	286	781	210	132	136
5	1330	250	444	190	190	195	778	194	581	203	240	79
6	1280	273	462	190	190	190	631	259	631	143	149	81
7	1140	238	393	190	190	205	691	224	399	210	252	130
8	926	235	423	190	190	265	614	235	264	157	112	192
9	716	227	372	190	190	235	724	101	326	151	79	139
10	732	224	344	190	190	215	553	261	224	135	209	129
11	557	220	320	190	190	210	674	201	331	90	134	128
12	512	183	290	190	190	250	581	237	325	126	83	66
13	502	246	200	190	190	760	571	178	319	207	86	66
14	414	206	230	190	190	1600	569	154	277	148	128	68
15	418	203	200	190	190	2300	603	179	329	83	189	112
16	380	203	240	190	190	2800	530	184	487	132	94	80
17	410	134	240	190	195	3000	530	190	486	167	70	120
18	433	173	180	190	195	2750	518	91	403	78	70	149
19	418	284	190	190	200	2400	496	179	587	74	79	117
20	449	213	200	190	205	2000	505	149	629	187	95	145
21	444	216	200	190	210	1650	499	134	648	124	111	179
22	462	227	205	190	220	1400	487	235	638	200	55	148
23	502	235	210	190	230	1200	470	101	586	281	61	156
24	462	300	210	190	235	1120	413	199	541	302	153	147
25	427	304	215	190	235	1110	388	213	438	373	64	187
26	336	276	215	190	235	1040	304	268	534	322	109	153
27	423	670	215	190	230	764	345	244	327	140	120	148
28	397	872	215	190	225	813	271	341	426	162	176	154
29	224	627	215	190	---	675	285	323	405	228	58	103
30	376	548	210	190	---	676	269	252	331	170	65	112
31	288	---	210	190	---	1150	---	420	---	243	134	---
TOTAL	23088	8846	9408	5925	5655	31823	17010	6686	14586	5809	3718	3801
MEAN	745	295	303	191	202	1027	567	216	486	187	120	127
MAX	3230	872	670	205	235	3000	984	420	873	373	252	192
MIN	224	134	180	190	190	190	269	91	224	74	55	66
CFSM	1.91	.76	.78	.49	.52	2.63	1.45	.55	1.25	.48	.31	.33
IN.	2.20	.84	.90	.57	.54	3.04	1.62	.64	1.39	.55	.35	.36

CAL YR 1981 TOTAL 138935 MEAN 381 MAX 3950 MIN 42 CFSM .98 IN 13.25
WTR YR 1982 TOTAL 136355 MEAN 374 MAX 3230 MIN 55 CFSM .96 IN 13.01

04156000 TITTABAWASSEE RIVER AT MIDLAND, MI

LOCATION.--Lat 43°35'45", long 84°14'08", in NW¼ NE¼ sec.28, T.14 N., R.2 E., Midland County, Hydrologic Unit 04080201, on right bank 2,000 ft (610 m) downstream from dam at Dow Chemical Co. powerplant in Midland, 0.7 mi (1.1 km) upstream from Bullock Creek, 1.4 mi (2.3 km) downstream from Chippewa River and 23 mi (37 km) upstream from mouth.

DRAINAGE AREA.--2,400 mi² (6,200 km²), approximately.

PERIOD OF RECORD.--March 1936 to current year. Gage-height records for flood seasons collected in this vicinity 1910-26, 1928, and since 1946 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1045: 1945. WSP 1144: 1948.

GAGE.--Water-stage recorder. Datum of gage is 580.28 ft (176.869 m) National Geodetic Vertical Datum of 1929. Prior to Sept. 30, 1955, at datum 10.00 ft (3.048 m) higher.

REMARKS.--Records good except those for the winter period, which are poor. Water is diverted from river a short distance above station for industrial use. Small part returned to river 0.25 mi (0.4 km) below station, remainder returned 1 mi (1.6 km) below. Extremes and daily discharges not adjusted for diversion. Prior to May 20, 1970, discharge below 4,000 ft³/s (113 m³/s) regulated by dam 2,000 ft (610 m) above station; fixed crest dam since. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--46 years, 1,664 ft³/s (47.12 m³/s), 9.42 in/yr (239 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 34,000 ft³/s (963 m³/s) Mar. 21, 1948, gage height, 29.50 ft (8.992 m); minimum, 39 ft³/s (1.10 m³/s) Oct. 1, 1942; minimum daily, 111 ft³/s (3.14 m³/s) Aug. 21, 1949; minimum gage height, 9.04 ft (2.755 m) Aug. 19, 1954, caused by bridge construction above station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known since at least 1907, 29.7 ft (9.05 m) Mar. 28, 1916, discharge, 34,800 ft³/s (986 m³/s), from information by U.S. Weather Bureau.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 7,000 ft³/s (198 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 2	1900	8,800	249	18.75	5.715	Apr. 1	1100	10,200	289	20.16	6.145
Mar. 16	2200	10,800	306	20.74	6.322	June 2	1100	8,000	227	18.51	5.642
Mar. 25	0630	*10,900	309	*20.86	6.358	June 21	1030	7,940	225	18.45	5.624

Minimum discharge, 264 ft³/s (7.48 m³/s) Sept. 13, gage height, 9.30 ft (2.835 m); minimum daily, 298 ft³/s (8.44 m³/s) Sept. 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3620	703	3900	600	1450	1210	10100	1360	5690	1900	567	708
2	8310	971	3870	509	1890	1150	8790	1180	7790	1190	986	839
3	7620	1190	3950	447	1630	1340	7830	1780	7130	909	1070	833
4	4400	1200	3920	1300	1040	1380	8600	1920	4940	798	1290	490
5	3560	1200	1980	2130	1100	1200	7590	1550	3130	764	1420	377
6	3710	1180	1420	2210	535	798	5360	1180	1880	1050	1010	352
7	4010	704	1950	1810	420	567	5030	1140	1780	1110	660	721
8	4060	587	2190	1540	760	969	4920	1050	1690	1030	558	838
9	3480	1020	2180	1390	1110	1090	4980	962	1450	986	704	785
10	2190	1120	1730	1420	1090	1110	4610	1560	1650	600	1070	755
11	1400	1090	1760	1510	1070	1350	3890	1460	1850	524	911	393
12	1680	1030	1280	1240	960	1640	3690	1370	1150	836	760	298
13	1910	977	695	1100	520	2900	3570	1180	977	1010	458	592
14	1570	526	1490	1160	460	6280	3680	1030	1470	886	420	661
15	1700	474	1540	1150	430	8790	3850	649	1740	872	431	761
16	1890	821	1230	650	835	10400	4320	601	4980	977	447	822
17	1300	853	1010	772	1170	10700	4300	1180	6190	658	357	903
18	1280	843	767	881	1720	10200	3650	986	4840	544	496	562
19	2760	1090	493	874	1740	9660	4150	1140	4170	739	495	358
20	3300	1110	502	861	975	9520	4100	1030	6830	2050	674	992
21	2900	718	696	962	500	8840	3990	1130	7710	2150	417	1590
22	2850	685	953	1090	1260	8230	3830	687	6300	1940	322	1580
23	2850	1380	1230	695	1840	8560	3420	628	5170	1420	624	1300
24	1910	1910	1090	450	1910	10200	3350	1620	4420	880	762	835
25	1210	1850	613	700	1490	10800	1820	2070	3870	779	712	471
26	1380	1130	552	815	1300	9890	2270	2100	3890	1020	734	436
27	1690	2940	503	1110	1010	7260	2530	1700	2140	862	741	765
28	1790	6090	984	1140	753	5570	2470	4280	2380	978	494	838
29	1420	5570	1460	1120	---	5030	2440	4870	2730	1440	350	744
30	1440	4510	1750	530	---	5550	2270	4570	2540	1110	645	872
31	853	---	1460	440	---	8980	---	5480	---	714	751	---
TOTAL	84043	45472	49148	32606	30968	171164	135400	53363	112477	32726	21336	22471
MEAN	2711	1516	1585	1052	1106	5521	4513	1721	3749	1056	688	749
MAX	8310	6090	3950	2210	1910	10800	10100	5480	7790	2150	1420	1590
MIN	853	474	493	440	420	567	1820	601	977	524	322	298
†	44.1	33.3	22.7	0	21.0	18.2	25.5	17.0	12.4	19.2	16.1	10.4
MEAN‡	2755	1549	1608	1052	1127	5539	4538	1738	3761	1075	704	759
CFSM‡	1.15	.65	.67	.44	.47	2.31	1.89	.72	1.57	.45	.29	.32
IN‡	1.32	.72	.77	.51	.49	2.66	2.11	.83	1.75	.52	.34	.35

CAL YR 1981 TOTAL 701479 MEAN 1922 MAX 11900 MIN 257 MEAN‡ 1950 CFSM‡ .81 IN‡ 11.04
WTR YR 1982 TOTAL 791174 MEAN 2168 MAX 10800 MIN 298 MEAN‡ 2188 CFSM‡ .91 IN‡ 12.37

† Diversion, in cubic feet per second, for industrial use furnished by Dow Chemical Co.
‡ Adjusted for diversion.

04157000 SAGINAW RIVER AT SAGINAW, MI
(National stream-quality accounting network station)

LOCATION.--Lat 43°24'46", long 83°57'47", in NW¼ SE¼ sec.26, T.12 N., R.4 E., Saginaw County, Hydrologic Unit 04080206, on right bank 1,000 ft (305 m) downstream from bridge on Rust Avenue in Saginaw, 1.9 mi (3.1 km) downstream from Tittabawassee River and 20.3 mi (32.7 km) upstream from mouth. Water quality sampling site at downstream side of bridge on Rust Avenue.

DRAINAGE AREA.--6,060 mi² (15,700 km²), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--1904, 1908-9, 1912-13, 1916, 1918-19, 1929-30, and 1942 (flood discharge for certain periods only) in WSP 1084; December 1942 to current year (high-water periods only); no high water 1944, 1949, 1953, 1955, 1958, 1961, 1963, 1964, 1966. Gage-height records for flood seasons collected in this vicinity 1910-20, and for entire years since 1921 are contained in reports of U.S. Weather Bureau.

GAGE.--Water-stage recorder. Datum of gage is 565.11 ft (172.246 m), International Great Lakes datum. Prior to Oct. 1, 1972, non-recording gage at site 1.9 mi (3.1 km) downstream at same datum. Auxiliary water-stage recorder on right bank near Aplin Beach, 19.9 mi (32.0 km) downstream.

REMARKS.--Water-discharge records good. Considerable diversion through metropolitan area of Saginaw. National Weather Service gage-height telemark at station.

COOPERATION.--Auxiliary gage-height record furnished by NOAA-National Ocean Survey.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 68,000 ft³/s (1,930 m³/s) Mar. 30, 1904, gage height, 24.9 ft (7.59 m), site then in use.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 39,800 ft³/s (1,130 m³/s) Mar. 16; maximum daily gage height, 20.31 ft (6.190 m) Mar. 16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15300	---	11700			---	29600		---			
2	19600	---	---			---	22400		13400			
3	27400	---	---			---	26200		12200			
4	29700	---	---			---	19300		12100			
5	26900	---	---			---	18500		10200			
6	23900	---	---			---	16400		---			
7	19600	---	---			---	15400		---			
8	18400	---	---			---	17000		---			
9	16800	---	---			---	15900		---			
10	14100	---	---			---	13400		---			
11	11400	---	---			---	12300		---			
12	---	---	---			---	11800		---			
13	---	---	---			---	11700		---			
14	---	---	---			20300	11500		---			
15	---	---	---			29300	12400		---			
16	---	---	---			39800	11500		---			
17	---	---	---			37200	---		---			
18	---	---	---			35700	13100		---			
19	---	---	---			35900	---		---			
20	---	---	---			36000	12700		---			
21	---	---	---			32600	---		10800			
22	---	---	---			29300	10200		11100			
23	---	---	---			26500	---		10400			
24	---	---	---			25100	---		---			
25	---	---	---			24700	---		---			
26	---	---	---			23800	---		---			
27	---	---	---			21700	---		---			
28	---	---	---			18500	---		---			
29	---	11700	---			15700	---		---			
30	---	10600	---			14500	---		---			
31	---	---	---			17300	---		---			

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to September 1981.
WATER TEMPERATURES: November 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor November 1976 to September 1981.

REMARKS.--Bimonthly samples are collected as a cross-section sample at Rust Ave. bridge. Occasional winter samples are collected near vicinity of Court St. bridge. Water-discharge measurements are made at times of sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded, 1,230 micromhos Jan. 5, 1977; minimum recorded, 224 micromhos Mar. 13, 1977.
WATER TEMPERATURES: Maximum, 30.0°C July 10, 14, 20, 1977; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT												
05...	1400	27500	370	7.6	11.5	6.8	63	1300	1800	170	47	47
DEC												
16...	1230	3200	747	8.1	.5	12.0	84	160	97	310	77	85
FEB												
03...	1000	--	800	7.7	.0	11.3	78	272	K63	310	85	86
MAR												
17...	1030	36500	265	7.3	.5	11.1	78	K6300	26000	110	--	30
JUN												
09...	1030	4060	630	8.2	22.0	7.0	80	K320	210	260	62	73
AUG												
18...	1330	-160	806	8.4	26.0	15.6	217	K62	160	260	75	67

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
OCT												
05...	12	9.3	11	4.4	120	33	22	.2	5.9	249	214	.34
DEC												
16...	23	28	16	2.9	230	55	63	.2	6.2	446	402	.61
FEB												
03...	22	45	24	2.9	220	57	96	.2	9.0	488	450	.66
MAR												
17...	7.9	8.3	14	4.6	--	20	17	.1	3.7	168	147	.23
JUN												
09...	20	26	17	3.0	203	41	58	.2	5.9	436	358	.59
AUG												
18...	22	60	33	3.4	180	53	130	.3	1.0	536	445	.73

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT												
05...	18500	1.9	.080	.10	.97	.170	.52	.060	--	82	6090	100
DEC												
16...	3850	1.8	.290	.37	.94	.060	.19	.090	.040	5	43	100
FEB												
03...	--	.97	.460	.59	1.10	.070	.21	.050	.050	3	--	100
MAR												
17...	16600	1.2	.380	.49	2.50	.230	.71	.160	.090	101	9950	100
JUN												
09...	4780	1.8	.070	.09	2.10	.150	.46	.050	.040	39	428	100
AUG												
18...	232	.39	<.010	.01	1.20	.200	.61	.030	.020	47	20	100

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
OCT										
05...	1400	3	<2	100	30	3	1	10	<10	3
DEC										
16...	1230	1	1	100	47	<1	<1	10	<10	<1
MAR										
17...	1030	2	1	<100	29	2	<1	30	10	2
AUG										
18...	1330	4	3	100	50	--	2	10	10	2

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
OCT										
05...	2	21	5	3100	62	9	<1	60	8	.1
DEC										
16...	<1	8	3	380	40	2	<1	50	35	.2
MAR										
17...	<1	23	7	3000	120	15	3	90	39	.2
AUG										
18...	1	8	<2	790	11	6	2	100	2	<.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
OCT									
05...	<.1	7	3	<1	<1	<1	<1	50	<4
DEC									
16...	.1	4	<1	<1	<1	<1	<1	70	8
MAR									
17...	.1	6	1	<1	<1	<1	<1	270	34
AUG									
18...	<.1	12	4	<1	<1	<1	<1	30	8

04158500 PIGEON RIVER NEAR OWENDALE, MI

LOCATION.--Lat 43°45'40", long 83°14'46", in SW¼ SE¼ sec.36, T.16 N., R.10 E., Huron County, Hydrologic Unit 04080103, on left bank 600 ft (183 m) downstream from bridge on Kilmanagh Road, 2.5 mi (4.0 km) downstream from confluence of East and West Branches, and 2.5 mi (4.0 km) northeast of Owendale.

DRAINAGE AREA.--53.2 mi² (138 km²).

PERIOD OF RECORD.--October 1952 to September 1982 (discontinued).

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 645 ft (197 m) from topographic map. Prior to June 10, 1954, nonrecording gage at site 600 ft (183 m) upstream at same datum.

REMARKS.--Records fair except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--30 years, 32.3 ft³/s (0.915 m³/s), 8.24 in/yr (209 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,550 ft³/s (72.2 m³/s) Mar. 25, 1954, gage height, 10.75 ft (3.277 m), from rating curve extended above 1,200 ft³/s (34.0 m³/s), site and datum then in use; maximum gage height, 11.50 ft (3.505 m) Mar. 14, 1982, backwater from ice; minimum discharge, 0.1 ft³/s (0.003 m³/s) July 31, Aug. 1, 1964.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 500 ft³/s (14.2 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Nov. 28	0200	583	16.5	7.64	2.329	Mar. 31	1400	*1,030	29.2	10.72	3.267
Mar. 14	--	639	18.1	*a11.50	3.505						

a ice jam.

Minimum discharge, 1.2 ft³/s (0.034 m³/s) Sept. 15, 16, gage height, 2.78 ft (0.847 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	146	28	72	20	8.0	8.3	485	20	33	18	5.1	3.7
2	349	28	77	14	8.0	8.3	135	19	48	16	4.9	4.2
3	254	27	82	17	8.0	8.3	92	17	32	14	4.9	4.1
4	180	27	70	19	8.0	8.3	86	16	24	15	4.6	3.6
5	52	27	61	20	8.0	8.3	67	15	20	14	4.2	2.9
6	48	29	54	21	8.0	8.3	52	16	17	12	3.9	2.6
7	64	31	51	20	8.0	8.3	56	16	15	11	3.6	2.5
8	52	29	50	19	8.0	8.3	51	18	15	10	5.0	2.4
9	49	27	45	19	8.0	8.3	60	16	14	9.2	5.1	2.4
10	52	25	36	18	8.0	9.0	58	15	14	8.5	3.6	2.2
11	46	24	38	18	8.0	11	55	15	14	9.4	3.3	2.1
12	42	23	33	17	8.0	22	53	14	12	8.8	3.1	2.0
13	38	22	30	17	8.0	300	60	13	11	6.9	2.9	1.7
14	35	22	29	16	8.0	550	78	13	10	6.2	2.5	1.7
15	37	22	29	15	8.0	450	64	13	16	6.2	2.5	1.6
16	48	22	28	14	8.0	370	62	13	89	5.7	2.4	2.0
17	40	22	25	12	8.2	330	159	12	66	5.5	2.2	2.0
18	42	21	19	10	8.3	260	124	12	42	6.2	1.9	4.6
19	49	22	24	9.4	8.3	165	79	15	60	6.2	1.7	5.6
20	45	42	22	9.0	8.3	135	76	16	112	5.5	2.4	4.4
21	37	119	20	8.8	8.3	115	67	15	152	4.7	2.6	4.3
22	37	100	20	8.5	8.3	139	52	13	144	4.3	2.5	4.1
23	42	67	20	8.4	8.3	173	44	15	73	4.4	3.2	7.4
24	42	56	18	8.3	8.3	197	39	18	53	3.6	3.3	7.3
25	43	48	19	8.2	8.3	170	35	17	42	2.9	7.8	5.7
26	40	50	19	8.1	8.3	103	32	15	45	2.9	7.8	5.3
27	39	354	19	8.0	8.3	76	29	14	40	5.0	5.1	6.4
28	37	431	19	8.0	8.3	66	25	17	34	11	3.7	9.8
29	33	148	18	8.0	---	63	23	24	28	9.2	3.2	8.0
30	30	83	17	8.0	---	105	21	19	23	6.5	3.6	6.3
31	29	---	18	8.0	---	805	---	16	---	5.7	3.5	---
TOTAL	1989	1976	1082	414.7	227.5	4688.7	2319	487	1298	254.5	116.1	122.9
MEAN	64.2	65.9	34.9	13.4	8.13	151	77.3	15.7	43.3	8.21	3.75	4.10
MAX	349	431	82	21	8.3	805	485	24	152	18	7.8	9.8
MIN	29	21	17	8.0	8.0	8.3	21	12	10	2.9	1.7	1.6
CFSM	1.21	1.24	.66	.25	.15	2.84	1.45	.30	.81	.15	.07	.08
IN.	1.39	1.38	.76	.29	.16	3.28	1.62	.34	.91	.18	.08	.09

CAL YR 1981 TOTAL 18695.1 MEAN 51.2 MAX 860 MIN 1.8 CFSM .96 IN 13.07
WTR YR 1982 TOTAL 14975.4 MEAN 41.0 MAX 805 MIN 1.6 CFSM .77 IN 10.47

04159010 PIGEON RIVER NEAR CASEVILLE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 43°56'22", long 83°14'30", in SW¼ NW¼ sec.31, T.18 N., R.11 E., Huron County, Hydrologic Unit 04080103, at bridge on Kinde Road, 1.5 mi (2.4 km) east of Caseville, and 3.1 mi (5.0 km) upstream from mouth.

DRAINAGE AREA.--125 mi² (324 km²).

PERIOD OF RECORD.--January 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: April 1978 to September 1981.
WATER TEMPERATURES: April 1978 to September 1981.

REMARKS.--Bimonthly samples are collected as a cross-section sample at or near vicinity of bridge. Water-discharge measurements are made at times of sampling. Some regulation at low flows.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily recorded, 2,000 micromhos Oct. 20, 1979; minimum daily recorded, 175 micromhos Mar. 6, 1979.
WATER TEMPERATURES: Maximum daily recorded, 27.5°C July 7, 1978; minimum daily recorded, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT												
19...	1400	60	925	8.2	7.0	10.4	87	290	1400	500	180	141
DEC												
15...	1300	48	979	8.1	.5	13.9	98	K30	580	490	170	138
FEB												
02...	1300	6.4	947	7.8	.0	9.1	62	210	110	450	150	127
MAR												
16...	1430	1180	214	7.4	.0	10.6	75	K400	K100000	93	26	28
JUN												
08...	1330	28	906	8.2	18.5	10.9	117	380	810	440	--	120
AUG												
17...	1400	1.3	707	8.2	21.0	11.6	130	210	360	310	130	83

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
OCT												
19...	37	17	7	4.3	320	130	63	.2	7.3	664	592	.90
DEC												
15...	35	14	6	2.5	320	130	54	.2	5.6	607	572	.83
FEB												
02...	32	16	7	2.5	300	120	39	.3	9.3	577	526	.78
MAR												
16...	5.5	3.1	6	6.4	67	31	10	.2	2.7	129	127	.18
JUN												
08...	34	14	6	3.2	--	130	56	.2	1.4	689	478	.94
AUG												
17...	26	21	13	3.6	190	110	43	.3	.8	415	402	.56

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT												
19...	108	6.3	.140	.18	.51	.040	.12	.030	.010	41	6.6	100
DEC												
15...	78.7	8.1	.110	.14	.39	.040	.12	.040	.030	73	9.5	100
FEB												
02...	10.0	2.3	.190	.24	.49	.060	.18	.050	.050	20	.35	100
MAR												
16...	411	1.6	.660	.85	1.50	.460	1.4	.290	.260	79	252	100
JUN												
08...	52.6	8.6	.040	.05	.80	.060	.18	.030	.040	16	1.2	100
AUG												
17...	1.4	<.10	.030	.04	.30	.150	.46	.110	.100	20	.07	100

04159010 PIGEON RIVER NEAR CASEVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
DEC										
15...	1300	1	1	100	49	<1	<1	10	<10	<1
MAR										
16...	1430	2	1	100	20	1	<1	20	10	2
JUN										
08...	1330	2	1	100	56	1	<1	10	<10	3
AUG										
17...	1400	5	4	100	42	1	<1	20	20	3

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
DEC										
15...	<1	5	2	290	12	2	1	40	32	.2
MAR										
16...	<1	19	4	3400	86	2	<1	70	18	.2
JUN										
08...	<1	29	3	430	12	4	3	40	17	<.1
AUG										
17...	1	6	1	630	19	3	1	180	70	<.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
DEC									
15...	.1	1	<1	<1	<1	<1	<1	70	10
MAR									
16...	.1	7	2	<1	<1	<1	<1	30	7
JUN									
08...	<.1	54	3	1	1	<1	<1	20	14
AUG									
17...	<.1	4	3	<1	<1	<1	<1	40	15

04159130 ST. CLAIR RIVER AT PORT HURON, MI
(National stream-quality accounting network station)

LOCATION.--Lat 42°59'19", long 82°25'29", in SE, sec.3, T.6 N., R.17 E., St. Clair County, Hydrologic Unit 04090001, at Port Huron municipal water treatment plant in Port Huron.

DRAINAGE AREA.--222,400 mi² (576,000 km²), approximately.

PERIOD OF RECORD.--Water years 1970-73, January 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: April 1978 to September 1981.
WATER TEMPERATURES: April 1978 to September 1981.

REMARKS.--Bimonthly samples were collected from a stilling well located in the Port Huron municipal water treatment plant. January discharge affected by ice.

COOPERATION.--Water-discharges were furnished by the National Oceanic and Atmospheric Administration.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 260 micromhos Dec. 18, 1980; minimum daily, 194 micromhos Jan. 27, 28, 1980.
WATER TEMPERATURES: Maximum daily, 24.0°C Aug. 14-16, 1980; minimum daily, 0.0°C on many days during winter periods.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--Specific conductance values of 164 micromhos July 3, 1972, and 265 micromhos Mar. 18, 1982, were observed.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)
NOV											
20...	1400	210000	201	8.1	8.0	11.7	103	K8	24	92	--
JAN											
14...	1115	144000	201	7.2	.5	13.5	96	<1	<1	96	21
MAR											
19...	1230	177000	208	8.2	1.0	13.4	96	K7	>100	97	16
MAY											
21...	0930	200000	202	8.0	11.5	11.8	109	K2	K12	97	13
JUN											
17...	1230	194000	217	7.9	13.0	10.7	104	<1	K14	100	18
SEP											
17...	1000	201000	205	7.7	18.0	8.4	90	K4	27	99	10

DATE	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)
NOV											
20...	26	6.5	3.5	8	.8	75	16	6.1	<.1	--	117
JAN											
14...	26	7.5	3.9	8	.7	75	16	5.6	.1	1.6	112
MAR											
19...	27	7.2	3.6	7	1.2	81	19	6.4	.1	1.3	119
MAY											
21...	27	7.2	3.7	8	.8	84	17	6.5	.1	1.9	98
JUN											
17...	28	7.3	3.8	8	.7	82	15	6.2	.1	.9	122
SEP											
17...	28	7.1	3.2	7	.8	82	16	5.9	.1	1.2	136

DATE	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)
NOV											
20...	--	.16	66300	.27	.010	.01	.22	<.010	--	<.010	<.010
JAN											
14...	107	.15	43500	.32	.010	.01	.25	.030	.09	<.010	<.010
MAR											
19...	115	.16	56900	.31	.020	.03	1.00	.010	.03	.010	<.010
MAY											
21...	115	.13	52900	.30	<.010	.01	.50	.010	.03	.010	<.010
JUN											
17...	111	.17	63900	.28	.010	.01	.20	--	.09	.040	<.010
SEP											
17...	116	.18	73800	.22	.010	.01	1.60	--	--	.030	<.010

04159130 ST. CLAIR RIVER AT PORT HURON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
JAN										
14...	1115	1	1	<100	16	<1	<1	10	<10	<1
MAR										
19...	1230	1	<1	100	17	1	<1	10	<10	<1
JUN										
17...	1230	1	<1	<100	18	1	<1	10	<10	3
SEP										
17...	1000	2	1	<100	19	1	<1	10	10	5

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
JAN										
14...	<1	10	2	60	<3	<1	<1	<10	<1	<.1
MAR										
19...	<1	8	1	100	9	<1	<1	<10	<1	<.1
JUN										
17...	3	6	3	90	<3	4	2	10	<1	<.1
SEP										
17...	1	4	2	240	16	9	3	10	<1	<.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
JAN									
14...	<.1	6	<1	<1	<1	<1	<1	90	<4
MAR									
19...	<.1	3	1	<1	<1	<1	<1	10	<4
JUN									
17...	<.1	11	1	<1	<1	<1	<1	10	<4
SEP									
17...	<.1	3	2	<1	<1	<1	<1	80	<4

04159488 SILVER CREEK NEAR JEDDO, MI

LOCATION.--Lat 43°08'40", long 82°39'07", in SE¼ NW¼ sec.12, T.8 N., R.15 E., St. Clair County, Hydrologic Unit 04090001, on left bank 10 ft (3 m) downstream of bridge on Comstock Road, 3.5 mi (5.6 km) west of Jeddo.

DRAINAGE AREA.--20.6 mi² (53.4 km²).

PERIOD OF RECORD.--January 1978 to September 1982 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 707.43 ft (215.625 m) National Geodetic Vertical Datum of 1929 (levels by local surveying firm).

REMARKS.--Records fair. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,120 ft³/s (31.7 m³/s) Mar. 13, 1982, gage height, 9.92 ft (3.024 m); maximum gage height, 10.43 ft (3.179 m) Feb. 18, 1981, backwater from ice; minimum discharge, 0.05 ft³/s (0.001 m³/s) Aug. 23, 24, 25, 1981; minimum gage height, 3.62 ft (1.103 m) Aug. 17, 18, 1978, Aug. 18, 19, 1982.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 300 ft³/s (8.50 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	0900	902	25.5	9.36	2.853	Mar. 14	1800	1,050	29.7	9.73	2.966
Oct. 28	0100	364	10.3	7.31	2.228	Mar. 30	2400	722	20.4	8.73	2.661
Mar. 13	2100	*1,120	31.7	*9.92	3.024						

Minimum discharge, 0.18 ft³/s (0.005 m³/s) Sept. 13, 14, 15; minimum gage height, 3.62 ft (1.103 m) Aug. 18, 19.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	701	6.5	17	2.1	.70	.92	59	3.6	2.0	.80	.43	.39
2	282	5.5	53	2.1	.70	1.0	22	3.9	1.6	.77	3.6	.77
3	35	5.0	30	2.3	.70	1.5	69	2.8	1.0	.67	13	.88
4	15	4.5	15	3.5	.70	1.1	29	3.2	1.2	.82	9.1	.72
5	8.9	4.0	11	6.0	.70	1.2	12	3.9	1.3	.80	1.3	.55
6	49	7.0	8.2	8.0	.70	1.3	16	3.7	1.5	.73	.46	.49
7	49	12	7.1	7.0	.70	1.3	8.5	3.5	1.1	.80	.37	.38
8	16	6.5	7.1	4.5	.70	1.3	12	4.2	.94	28	.37	.36
9	7.0	4.7	5.8	3.0	.70	1.4	28	2.9	.71	20	.36	.31
10	4.2	4.0	3.8	2.0	.70	1.6	47	2.1	.79	9.4	.32	.49
11	3.0	3.7	2.7	1.4	.70	1.8	47	2.1	.69	.81	.32	.30
12	2.2	3.4	2.5	1.1	.70	9.7	58	2.0	.97	.55	.31	.26
13	1.9	3.2	2.5	1.0	.70	465	88	2.1	.77	.48	.31	.21
14	4.1	3.0	2.7	.90	.70	909	35	2.9	.98	.46	.31	.21
15	2.3	2.9	3.0	.85	.70	594	15	3.1	1.3	.47	.31	.22
16	1.9	2.8	3.3	.80	.70	240	14	2.3	2.4	.46	.31	.24
17	1.6	2.7	3.2	.75	.70	227	177	1.7	1.2	.76	.31	.26
18	2.8	2.7	3.0	.72	.72	134	33	1.7	.93	.66	.29	.65
19	2.8	3.5	2.8	.71	.74	115	13	3.4	4.9	.56	.27	.32
20	3.2	6.0	2.5	.70	.76	87	8.7	3.6	5.2	.49	.27	.26
21	3.7	40	2.3	.70	.78	102	6.5	2.3	3.4	.58	.27	.25
22	41	20	2.2	.70	.80	97	4.9	2.5	3.6	.46	.31	.33
23	41	12	2.1	.70	.82	94	4.6	2.2	3.3	.43	.36	.35
24	22	9.0	2.1	.70	.84	93	3.2	1.8	3.4	.41	.34	.34
25	10	6.3	2.0	.70	.86	64	2.8	1.7	2.2	.40	1.1	.26
26	6.4	11	2.0	.70	.88	41	2.9	1.4	1.9	.41	.44	.22
27	74	159	2.0	.70	.90	24	2.6	1.4	1.6	.50	.35	.74
28	288	39	2.0	.70	.92	13	2.0	1.6	1.4	.88	.30	.78
29	30	21	2.0	.70	---	16	2.1	1.3	1.4	.53	.35	.46
30	12	11	2.0	.70	---	101	2.8	1.5	1.2	.44	.47	.35
31	8.0	---	2.0	.70	---	472	---	1.3	---	.47	.42	---
TOTAL	1729.0	421.9	208.9	57.13	20.92	3912.12	825.6	77.7	54.88	74.00	37.03	12.35
MEAN	55.8	14.1	6.74	1.84	.75	126	27.5	2.51	1.83	2.39	1.19	.41
MAX	701	159	53	8.0	.92	909	177	4.2	5.2	28	13	.88
MIN	1.6	2.7	2.0	.70	.70	.92	2.0	1.3	.69	.40	.27	.21
CFSM	2.71	.68	.33	.09	.04	6.12	1.34	.12	.09	.12	.06	.02
IN.	3.12	.76	.38	.10	.04	7.06	1.49	.14	.10	.13	.07	.02

CAL YR 1981 TOTAL 7235.47 MEAN 19.8 MAX 701 MIN .07 CFSM .96 IN 13.07
WTR YR 1982 TOTAL 7431.53 MEAN 20.4 MAX 909 MIN .21 CFSM .99 IN 13.42

04159500 BLACK RIVER NEAR FARGO, MI

LOCATION.--Lat 43°05'32", long 82°37'05", in NW¼ sec.32, T.8 N., R.16 E., St. Clair County, Hydrologic Unit 04090001, on left bank 20 ft (6 m) downstream from bridge on Norman Road, 2.1 mi (3.4 km) east of Fargo, 5.3 mi (8.5 km) upstream from Mill Creek, and 12 mi (19 km) northwest of Port Huron.

DRAINAGE AREA.--480 mi² (1,243 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--February 1944 to current year.

REVISED RECORDS.--WSP 1307: 1950(M). WSP 1627: 1956-58. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 613.75 ft (187.071 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to July 9, 1954, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair.

AVERAGE DISCHARGE.--38 years, 282 ft³/s (7.986 m³/s), 7.98 in/yr (203 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,400 ft³/s (408 m³/s) Apr. 5, 1947, gage height, 16.06 ft (4.895 m), from flood-mark, from rating curve extended above 9,500 ft³/s (269 m³/s); maximum gage height observed, 18.05 ft (5.502 m) Feb. 20, 1951, backwater from ice; minimum discharge observed, 1.8 ft³/s (0.051 m³/s) Sept. 18, 19, 1946.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,500 ft³/s (99.1 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 2	0900	4,900	139	11.30	3.444	Mar. 31	1600	5,070	144	11.47	3.496
Mar. 16	0200	*7,470	212	*13.48	4.109						

Minimum discharge, 14 ft³/s (0.40 m³/ s) Sept. 11, 17; minimum gage height, 1.78 ft (0.543 m) Sept. 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2470	332	325	64	40	54	4380	112	206	98	41	26
2	4670	290	465	68	40	56	3540	107	678	82	36	26
3	4080	254	492	76	40	58	1970	98	1040	75	39	75
4	3500	229	392	90	40	58	1240	91	382	68	51	63
5	2700	214	305	150	40	57	625	87	228	65	43	48
6	1410	295	251	337	40	56	457	84	165	60	38	40
7	1430	658	217	310	40	52	324	90	134	57	35	34
8	1070	526	210	210	40	48	391	110	114	60	33	28
9	604	342	205	160	40	47	598	149	96	63	29	25
10	434	260	165	100	40	50	1080	132	88	59	25	23
11	352	215	140	75	40	58	975	114	80	49	24	21
12	301	194	120	58	40	130	882	103	72	43	24	21
13	262	176	110	50	40	867	1070	96	67	41	23	20
14	224	163	100	47	40	4200	1220	92	60	40	22	18
15	214	155	90	44	40	5850	786	88	55	41	23	18
16	284	152	81	43	41	7210	510	90	86	38	22	16
17	330	149	78	42	41	6420	1180	84	212	43	23	16
18	302	141	76	40	42	6140	1060	82	173	45	21	22
19	363	140	72	40	42	5650	562	78	157	43	21	24
20	396	238	68	40	43	4870	392	72	552	47	20	24
21	322	1130	66	40	44	3830	339	70	680	42	21	27
22	486	1190	66	40	45	2910	289	70	780	38	20	26
23	887	602	66	40	46	2640	236	70	557	36	21	28
24	708	364	66	40	48	2720	206	70	370	33	21	29
25	464	287	66	40	49	2630	186	128	255	31	31	35
26	347	247	64	40	50	2030	167	153	192	30	37	35
27	348	678	64	40	51	1210	157	95	188	29	67	39
28	1610	995	64	40	52	715	143	77	155	37	52	41
29	1290	644	64	40	---	612	128	70	139	35	42	45
30	643	396	64	40	---	781	119	80	115	50	37	44
31	424	---	64	40	---	4110	---	182	---	55	30	---
TOTAL	32925	11656	4676	2484	1194	66119	25212	3024	8076	1533	972	937
MEAN	1062	389	151	80.1	42.6	2133	840	97.5	269	49.5	31.4	31.2
MAX	4670	1190	492	337	52	7210	4380	182	1040	98	67	75
MIN	214	140	64	40	40	47	119	70	55	29	20	16
CFSM	2.21	.81	.32	.17	.09	4.44	1.75	.20	.56	.10	.07	.07
IN.	2.55	.90	.36	.19	.09	5.12	1.95	.23	.63	.12	.08	.07

CAL YR 1981 TOTAL 181899 MEAN 498 MAX 5800 MIN 23 CFSM 1.04 IN 14.10
WTR YR 1982 TOTAL 158808 MEAN 435 MAX 7210 MIN 16 CFSM .91 IN 12.31

04159500 BLACK RIVER NEAR FARGO, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: August 1978 to current year.

INSTRUMENTATION.--Temperature recorder since Aug. 4, 1978 to current year.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 29.5°C July 13, 1981; minimum, 0.0° C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 27.0°C July 16, 18, Aug. 7; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	13.0	12.0	10.0	9.0	3.0	2.5	.5	.5	.0	.0	.0	.0
2	12.0	11.5	10.0	9.5	3.0	3.0	.5	.0	.0	.0	.0	.0
3	11.5	11.0	10.0	9.0	3.0	3.0	.0	.0	.0	.0	.0	.0
4	11.0	10.5	9.5	9.0	3.0	3.0	.0	.0	.0	.0	.0	.0
5	11.5	11.0	10.5	9.5	3.0	2.5	.0	.0	.0	.0	.0	.0
6	12.5	11.5	9.5	8.5	3.0	2.0	.0	.0	.0	.0	.0	.0
7	12.5	12.0	8.0	7.5	3.0	2.0	.0	.0	.0	.0	.0	.0
8	12.0	11.0	7.5	6.5	3.0	2.0	.0	.0	.0	.0	.0	.0
9	11.0	10.5	6.5	6.0	2.0	1.0	.0	.0	.0	.0	.0	.0
10	11.0	10.5	6.0	5.0	1.0	1.0	.0	.0	.0	.0	.0	.0
11	12.0	10.5	5.5	5.0	1.0	1.0	.0	.0	.0	.0	.0	.0
12	12.0	10.5	5.5	5.0	1.0	1.0	.0	.0	.0	.0	.0	.0
13	12.0	10.5	5.0	4.5	1.0	1.0	.0	.0	.0	.0	.0	.0
14	11.5	11.0	5.0	4.5	1.0	1.0	.0	.0	.0	.0	.5	.5
15	12.0	11.5	5.5	4.5	1.0	1.0	.0	.0	.0	.0	.5	.5
16	12.0	11.0	5.5	5.0	1.0	.5	.0	.0	.0	.0	.5	.5
17	11.5	10.0	6.0	5.0	.5	.5	.0	.0	.0	.0	.5	.5
18	11.5	11.0	5.5	5.5	.5	.5	.0	.0	.0	.0	.5	.5
19	11.0	9.5	5.5	5.5	.5	.5	.0	.0	.0	.0	.5	.5
20	10.0	9.0	5.5	5.0	.5	.5	.0	.0	.0	.0	.5	.5
21	10.0	9.0	5.0	3.5	.5	.5	.0	.0	.0	.0	1.0	.5
22	9.0	8.5	3.5	2.5	.5	.5	.0	.0	.0	.0	1.5	1.0
23	8.5	7.5	2.5	2.0	.5	.5	.0	.0	.0	.0	2.5	1.0
24	7.5	6.5	2.0	2.0	.5	.5	.0	.0	.0	.0	2.5	2.0
25	7.0	6.0	2.5	2.0	.5	.5	.0	.0	.0	.0	2.5	2.0
26	7.5	6.5	3.0	2.5	.5	.5	.0	.0	.0	.0	2.0	2.0
27	8.5	7.5	4.0	3.0	.5	.5	.0	.0	.0	.0	2.0	1.0
28	8.5	8.0	4.0	3.5	.5	.5	.0	.0	.0	.0	2.0	1.0
29	8.5	8.0	3.5	3.0	.5	.5	.0	.0	---	---	3.5	1.5
30	8.5	8.0	3.0	2.5	.5	.5	.0	.0	---	---	5.0	3.5
31	9.0	8.5	---	---	.5	.5	.0	.0	---	---	5.5	5.0
MONTH	13.0	6.0	10.5	2.0	3.0	.5	.5	.0	.0	.0	5.5	.0

04159500 BLACK RIVER NEAR FARGO, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	5.5	5.0	16.5	13.5	21.0	19.5	22.5	19.0	24.5	21.5	21.5	20.0
2	5.5	5.0	16.0	13.0	19.5	18.0	23.0	19.5	23.5	23.0	21.0	20.0
3	6.0	5.5	16.5	13.0	18.0	16.0	22.5	20.5	24.0	22.0	20.0	18.5
4	5.5	4.0	17.0	13.5	17.5	15.5	22.0	20.0	25.0	23.5	19.0	17.0
5	4.0	2.0	17.0	14.5	17.0	15.0	22.5	19.0	25.5	23.5	20.0	17.0
6	2.0	1.5	18.0	14.5	17.5	15.0	24.5	21.5	26.5	23.0	20.0	18.5
7	3.5	1.5	18.0	16.5	19.0	16.5	26.0	24.0	27.0	23.5	19.0	17.0
8	4.0	2.0	17.5	15.0	21.0	17.0	25.0	23.0	26.0	24.5	19.5	16.0
9	4.5	3.0	17.5	14.5	21.0	19.0	25.0	21.5	25.0	23.0	20.5	16.5
10	4.5	3.0	17.0	14.5	21.0	19.5	25.5	23.0	24.5	21.5	20.5	17.0
11	3.5	3.0	19.0	14.5	21.5	18.0	25.0	24.0	23.0	19.5	22.0	19.0
12	4.5	3.5	19.0	17.0	21.0	19.0	25.0	22.0	22.5	19.5	23.0	20.0
13	5.5	4.5	19.5	17.0	21.0	19.5	25.5	22.0	23.0	19.5	24.0	21.0
14	6.5	5.0	19.5	18.0	21.5	18.5	24.5	22.0	24.0	20.0	24.0	22.5
15	7.5	5.5	18.0	17.0	21.5	20.5	26.5	22.5	24.5	21.5	22.0	20.5
16	9.5	7.5	19.5	17.0	20.5	18.0	27.0	24.0	26.0	22.5	20.5	18.0
17	11.5	9.5	20.5	18.0	20.0	17.0	26.5	24.5	26.0	22.5	18.0	16.0
18	11.0	10.0	22.0	19.0	19.5	18.5	27.0	24.5	25.0	21.0	18.5	16.5
19	11.5	10.0	22.0	20.0	18.5	17.0	26.0	23.0	24.0	21.0	17.5	15.5
20	12.0	11.0	21.5	20.0	17.0	16.0	24.5	21.0	26.5	22.5	17.0	15.0
21	11.0	9.0	20.5	18.0	16.5	16.0	25.0	21.0	24.0	21.5	16.0	14.5
22	11.0	9.0	19.5	16.5	17.0	16.0	23.5	21.5	22.0	19.5	14.5	14.0
23	12.0	9.5	17.0	16.0	17.5	15.5	25.5	21.0	22.0	19.0	15.5	14.0
24	14.0	11.0	17.0	16.5	19.0	16.0	26.5	22.0	21.0	19.0	15.5	15.0
25	14.5	12.0	16.5	15.5	18.5	18.0	26.5	23.0	22.5	19.5	15.5	15.0
26	15.0	13.0	17.5	15.0	18.5	17.0	26.5	25.0	22.0	20.0	16.0	15.0
27	14.0	12.0	19.0	16.5	19.5	17.5	25.5	23.0	21.5	19.5	15.5	15.0
28	14.0	11.0	19.0	17.5	21.0	19.0	24.5	22.0	19.5	17.5	16.0	14.5
29	14.5	11.0	21.0	18.0	22.0	20.0	25.5	21.5	19.0	17.0	16.5	15.5
30	15.0	12.0	21.0	19.5	22.5	19.0	24.5	22.5	19.5	16.0	17.5	16.0
31	---	---	21.5	18.5	---	---	23.0	22.0	21.5	19.0	---	---
MONTH	15.0	1.5	22.0	13.0	22.5	15.0	27.0	19.0	27.0	16.0	24.0	14.0
YEAR	27.0	.0										

04160570 NORTH BRANCH BELLE RIVER AT IMLAY CITY, MI

LOCATION.--Lat 43°01'49", long 83°04'02", in SW¼ NW¼ sec.16, T.7 N., R.12 E., Lapeer County, Hydrologic Unit 04090001, on left bank 12 ft (4 m) upstream from bridge on State Highway 21, and 0.6 mi (1.0 km) northeast of Imlay City.

DRAINAGE AREA.--18.0 mi² (46.6 km²).

PERIOD OF RECORD.--August 1965 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 800 ft (244 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Some diversion by pumping for sprinkler irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--17 years, 11.5 ft³/s (0.326 m³/s), 8.68 in/yr (220 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 334 ft³/s (9.46 m³/s) Apr. 19, 1975, gage height, 9.33 ft (2.844 m); no flow for part of each day June 27, 28, 1977, June 26-28, 1979, caused by irrigation pumpage.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 60 ft³/s (1.70 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	1200	184	5.21	5.85	1.783	Mar. 31	0200	193	5.47	6.06	1.847
Mar. 14	1700	*216	6.12	*6.51	1.984						

Minimum discharge, 0.72 ft³/s (0.020 m³/s) Aug. 17, 18, 19, 22, gage height, 2.36 ft (0.719 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	162	13	15	6.9	4.5	7.0	106	7.9	18	5.5	2.6	2.2
2	149	13	18	6.0	4.5	7.4	59	7.5	14	4.6	2.9	2.5
3	84	12	16	6.3	4.5	7.4	55	7.2	11	4.6	2.7	2.7
4	49	10	14	14	4.5	7.0	35	6.9	8.5	9.1	2.6	3.2
5	39	12	13	23	4.5	6.6	25	6.7	7.3	7.6	2.5	2.7
6	54	14	12	14	4.5	6.0	24	6.7	6.5	5.9	2.2	2.6
7	53	12	12	10	4.5	5.4	24	13	5.8	4.9	2.0	2.1
8	37	11	13	7.5	4.5	5.0	25	17	5.3	4.0	1.8	1.9
9	31	9.8	11	5.6	4.5	5.4	33	12	4.9	3.6	1.7	1.9
10	26	10	8.9	5.4	4.5	6.0	33	10	5.1	3.2	1.6	1.8
11	24	14	7.8	5.2	4.5	7.0	33	8.7	4.4	3.9	1.6	1.8
12	24	13	7.6	5.0	4.5	10	36	7.6	3.9	3.7	1.3	1.8
13	18	11	7.9	5.0	4.5	145	44	6.9	3.7	3.2	1.2	1.8
14	16	7.9	8.1	5.0	4.6	199	34	6.4	3.4	3.1	1.1	2.0
15	17	7.4	8.4	5.0	4.7	185	27	5.8	4.3	3.0	1.0	2.2
16	16	6.9	7.3	5.0	4.8	140	25	5.5	5.9	2.6	.96	2.1
17	15	6.7	6.8	5.0	4.8	124	45	5.3	5.1	6.0	.89	2.1
18	15	7.1	6.0	5.0	4.9	93	29	4.9	10	5.5	.78	6.1
19	16	7.5	5.2	5.0	5.0	82	23	6.0	19	5.0	.83	3.7
20	14	29	4.8	5.0	5.2	71	27	6.1	15	4.5	1.4	3.3
21	15	35	4.7	4.9	5.2	67	21	5.2	12	3.6	1.1	3.0
22	23	26	5.2	4.8	5.4	61	15	7.8	10	3.4	.92	3.9
23	24	20	6.4	4.7	5.6	56	14	8.4	8.1	3.0	1.1	4.6
24	21	16	6.1	4.6	5.8	54	13	10	6.7	2.7	1.1	4.0
25	18	14	5.4	4.5	6.0	47	11	8.1	6.0	2.5	4.7	3.8
26	17	16	5.3	4.5	6.2	39	11	7.3	6.4	2.6	2.6	3.8
27	22	39	5.9	4.5	6.4	29	10	7.4	6.1	3.1	2.1	5.7
28	34	25	6.2	4.5	6.8	26	9.3	8.5	6.3	4.2	2.0	5.6
29	22	19	6.1	4.5	---	25	8.7	7.3	11	3.1	2.1	4.4
30	17	16	5.8	4.5	---	59	8.2	6.6	7.1	2.8	3.0	3.9
31	15	---	5.9	4.5	---	173	---	6.0	---	2.8	2.5	---
TOTAL	1087	453.3	265.8	149.4	139.9	1755.2	863.2	240.7	240.8	127.3	56.88	93.2
MEAN	35.1	15.1	8.57	4.43	5.00	56.6	28.8	7.76	8.03	4.11	1.83	3.11
MAX	162	39	18	23	6.8	199	106	17	19	9.1	4.7	6.1
MIN	14	6.7	4.7	4.5	4.5	5.0	8.2	4.9	3.4	2.5	.78	1.8
CFSM	1.95	.84	.48	.36	.28	3.14	1.60	.43	.45	.23	.10	.17
IN.	2.25	.94	.55	.41	.29	3.63	1.78	.50	.50	.26	.12	.19

CAL YR 1981 TOTAL 5876.70 MEAN 16.1 MAX 170 MIN 1.0 CFSM .89 IN 12.14
WTR YR 1982 TOTAL 5522.68 MEAN 15.1 MAX 199 MIN .78 CFSM .84 IN 11.41

04160600 BELLE RIVER AT MEMPHIS, MI

LOCATION.--Lat 42°54'03", long 82°46'09", in NW¼ SE¼ sec.35, T.6 N., R.14 E., St. Clair County, Hydrologic Unit 04090001, on right bank, at downstream side of bridge on State Highway 19 at Memphis.

DRAINAGE AREA.--151 mi² (391 km²).

PERIOD OF RECORD.--October 1962 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 720 ft (219 m) from topographic map (nearest 5 ft).

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Nov. 10 to Dec. 14, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years, 86.5 ft³/s (2.450 m³/s), 7.78 in/yr (198 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,520 ft³/s (128 m³/s) Apr. 19, 1975, gage height, 8.96 ft (2.731 m); minimum, 2.3 ft³/s (0.065 m³/s) Sept. 6, 10, 1978; minimum gage height, 1.17 ft (0.357 m) Sept. 6, 1978.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1947, reached a stage of about 9 ft (2.7 m), from information by local residents.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 600 ft³/s (17.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 2	0100	1,880	53.2	7.44	2.268	Mar. 31	1800	1,470	41.6	6.87	2.094
Mar. 14	2000	*2,250	63.7	*7.80	2.377	Apr. 17	2300	641	18.2	4.68	1.426

Minimum discharge, 4.0 ft³/s (0.11 m³/s) Aug. 16, 21, gage height, 1.27 ft (0.387 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1120	151	90	38	23	30	1150	50	38	39	10	9.4
2	1510	126	200	42	23	31	827	47	53	29	11	9.0
3	1070	108	270	35	23	40	620	46	60	25	11	8.4
4	889	91	190	60	23	35	485	44	47	32	11	8.6
5	644	85	130	106	23	31	297	42	41	45	10	8.4
6	428	95	100	149	23	31	185	42	36	46	9.6	8.3
7	530	102	85	131	23	29	175	45	32	35	8.6	8.9
8	448	88	80	100	23	27	171	66	30	29	8.1	7.8
9	296	75	75	75	23	27	193	86	28	23	7.5	6.6
10	213	64	70	50	23	29	273	68	27	20	7.4	6.8
11	161	60	65	40	23	32	309	59	25	19	6.6	6.8
12	113	55	60	30	23	44	351	55	24	18	6.5	6.6
13	100	53	55	28	23	452	508	66	22	18	6.0	6.5
14	88	50	50	27	23	1520	472	43	21	16	5.4	7.3
15	79	48	45	26	23	2120	309	39	22	15	4.6	7.8
16	75	48	52	25	24	1830	229	40	24	15	4.1	6.7
17	72	47	47	24	24	1760	540	40	26	15	4.9	8.2
18	71	46	45	24	24	1400	502	36	27	18	5.0	10
19	68	46	40	23	25	1230	281	32	29	22	4.9	13
20	70	55	36	23	25	924	199	30	48	18	4.8	13
21	68	170	35	23	25	773	173	29	57	16	4.5	12
22	83	220	35	23	26	698	137	29	47	14	4.9	11
23	163	150	37	23	27	632	101	29	40	13	5.2	11
24	163	100	39	23	28	602	86	34	33	12	5.4	12
25	125	80	39	23	28	540	75	34	29	12	11	13
26	99	75	37	23	29	450	68	33	26	10	13	13
27	106	80	38	23	29	325	59	32	25	11	14	15
28	396	140	38	23	30	239	59	34	27	11	10	18
29	480	130	38	23	---	195	55	39	44	12	8.8	20
30	307	100	38	23	---	249	52	43	54	12	8.8	14
31	207	---	35	23	---	1190	---	38	---	12	8.6	---
TOTAL	10242	2738	2194	1389	689	17515	8933	1350	1042	632	241.2	307.5
MEAN	330	91.3	70.8	42.2	24.6	565	298	43.5	34.7	20.4	7.78	10.3
MAX	1510	220	270	149	30	2120	1150	86	60	46	14	20
MIN	68	46	35	23	23	27	52	29	21	10	4.1	6.5
CFSM	2.19	.61	.47	.28	.16	3.74	1.97	.29	.23	.14	.05	.07
IN.	2.52	.67	.54	.32	.17	4.31	2.20	.33	.26	.16	.06	.08

CAL YR 1981 TOTAL 45485.2 MEAN 125 MAX 1520 MIN 7.9 CFSM .83 IN 11.21
WTR YR 1982 TOTAL 47192.7 MEAN 129 MAX 2120 MIN 4.1 CFSM .85 IN 11.63

04160800 SASHABAW CREEK NEAR DRAYTON PLAINS, MI

LOCATION.--Lat 42°43'12", long 83°21'15", in SE¼ sec.26, T.4 N., R.9 E., Oakland County, Hydrologic Unit 04090003, on right bank, at upstream side of culverts on Maybee Road, 1.1 mi (1.8 km) upstream from mouth, and 2.5 mi (4.0 km) northeast of Drayton Plains.

DRAINAGE AREA.--20.9 mi² (54.1 km²).

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Metal V-notch weir Aug. 30, 1961, to Mar. 6, 1968. Altitude of gage is 970 ft (296 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 12.3 ft³/s (0.348 m³/s), 7.99 in/yr (203 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 181 ft³/s (5.13 m³/s) Oct. 1, 1981, gage height, 4.53 ft (1.381 m); minimum, 0.2 ft³/s (0.006 m³/s) on many days during 1961, 1963, 1964, 1965, 1966; minimum gage height, 1.59 ft (0.485 m) Aug. 1, 2, 1960.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 45 ft³/s (1.27 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	1100	*181	5.13	*4.53	1.381	Mar. 31	0700	88	2.49	3.77	1.149
Mar. 24	0100	67	1.90	3.49	1.064	June 1	1700	54	1.53	3.24	0.988

Minimum discharge, 1.3 ft³/s (0.037 m³/s) Sept. 13, 14, gage height, 1.91 ft (0.582 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	146	27	18	12	8.5	8.2	78	17	45	17	4.8	3.1
2	108	25	18	12	8.5	8.0	66	17	42	15	4.3	2.9
3	76	23	18	12	8.5	8.0	60	16	34	16	4.0	2.7
4	68	22	17	15	8.5	8.0	54	15	29	17	4.0	2.5
5	49	22	17	16	8.5	8.0	47	15	22	17	3.7	2.5
6	44	23	16	15	8.5	8.0	45	14	19	15	3.7	2.5
7	41	22	15	14	8.5	8.1	47	19	17	14	3.4	2.5
8	37	28	15	13	8.5	8.1	48	25	15	13	3.1	2.3
9	33	19	15	12	8.5	8.5	45	21	14	12	3.1	2.3
10	31	18	14	11	8.5	8.1	46	18	13	11	2.7	1.8
11	29	17	13	11	8.5	11	46	17	12	12	2.5	1.5
12	28	17	12	11	8.5	13	45	15	11	12	2.3	1.5
13	27	16	12	11	8.5	33	49	15	9.9	11	2.2	1.4
14	26	16	12	11	8.5	52	46	14	8.8	9.9	2.3	2.0
15	25	15	12	11	8.5	56	43	13	11	9.5	2.3	2.5
16	25	15	12	10	8.5	50	41	13	25	8.8	2.2	2.2
17	25	15	12	10	9.0	55	47	12	19	9.2	2.2	2.1
18	25	15	11	10	9.5	56	44	12	16	9.5	2.2	3.9
19	24	14	11	9.8	10	61	39	12	22	9.2	2.2	3.0
20	22	19	9.9	9.5	10	60	38	11	24	8.8	2.5	2.6
21	22	22	9.5	9.5	10	64	35	11	23	7.8	2.5	2.3
22	28	20	10	9.5	10	61	33	13	20	7.8	2.2	2.4
23	29	18	10	9.5	9.5	62	30	15	20	7.4	2.3	2.9
24	27	17	11	9.0	9.0	64	27	14	17	6.4	2.3	2.8
25	25	16	11	9.0	8.5	60	25	13	16	5.7	9.2	3.3
26	23	17	11	9.0	8.5	53	24	13	16	5.7	5.7	4.7
27	28	23	11	9.0	8.4	50	23	13	15	6.0	4.3	5.8
28	41	21	11	8.8	8.2	46	21	19	16	10	3.7	6.3
29	34	20	11	8.6	---	43	19	33	21	8.5	3.4	4.6
30	32	19	11	8.5	---	50	18	38	19	6.7	3.7	3.8
31	29	---	11	8.5	---	85	---	29	---	5.7	3.1	---
TOTAL	1191	573	397.4	335.2	246.6	1166.0	1229	522	590.7	324.6	102.1	85.7
MEAN	38.4	19.1	12.8	10.8	8.81	37.6	41.0	16.8	19.7	10.5	3.29	2.89
MAX	146	27	18	16	10	85	78	38	45	17	9.2	6.3
MIN	22	14	9.5	8.5	8.2	8.0	18	11	8.8	5.7	2.2	1.4
CFSM	1.84	.91	.61	.52	.42	1.80	1.96	.80	.94	.50	.16	.14
IN.	2.12	1.02	.71	.60	.44	2.08	2.19	.93	1.05	.58	.18	.15

CAL YR 1981 TOTAL 6011.68 MEAN 16.5 MAX 146 MIN .73 CFSM .79 IN 10.70
WTR YR 1982 TOTAL 6764.30 MEAN 18.5 MAX 146 MIN 1.4 CFSM .89 IN 12.04

04160900 CLINTON RIVER NEAR DRAYTON PLAINS, MI

LOCATION.--Lat 42°39'37", long 83°23'25", in NE¼ sec.21, T.3 N., R.9 E., Oakland County, Hydrologic Unit 04090003, on left bank, at downstream side of bridge on State Highway 59, 1.0 mi (1.6 km) downstream from State fish hatchery, and 2.0 mi (3.2 km) south of Drayton Plains.

DRAINAGE AREA.--79.2 mi² (205.1 km²).

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 940 ft (287 m) from topographic map (nearest 10 ft). Jan. 29 to July 9, 1964, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation and occasional diversion for lake level control at many lakes above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 50.4 ft³/s (1.427 m³/s), 8.64 in/yr (219 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 276 ft³/s (7.82 m³/s) Mar. 12, 1974, gage height, 4.95 ft (1.509 m); minimum, 2.4 ft³/s (0.068 m³/s) May 31, 1961; minimum gage height, 1.23 ft (0.375 m) Jan. 4, 1961.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 217 ft³/s (6.15 m³/s) Oct. 6, 7, gage height, 4.72 ft (1.439 m); minimum, 9.1 ft³/s (0.26 m³/s) July 21, 25, 26, gage height, 2.09 ft (0.637 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	121	108	68	56	52	41	193	63	95	57	17	10
2	150	98	64	55	55	42	187	62	100	50	15	10
3	162	89	66	55	55	49	194	64	110	29	15	10
4	172	88	71	62	59	50	194	52	131	30	14	10
5	182	86	77	61	59	48	195	47	125	31	14	10
6	192	81	80	61	57	50	195	53	118	47	14	10
7	211	76	80	61	66	45	168	55	100	52	14	10
8	189	71	82	61	63	49	159	53	78	27	13	10
9	169	67	81	60	48	44	152	51	75	23	15	10
10	152	66	79	60	54	43	146	51	62	23	14	10
11	131	65	78	60	58	49	144	51	19	25	13	10
12	111	62	77	58	47	52	141	66	22	24	12	9.7
13	100	60	75	58	45	80	135	59	22	23	12	9.6
14	93	59	73	57	44	91	135	45	23	16	11	11
15	86	56	71	56	43	101	135	48	24	15	10	10
16	81	53	69	55	42	114	135	49	62	24	10	9.8
17	78	56	74	56	42	126	134	51	85	15	10	9.9
18	79	50	74	56	42	136	129	53	30	13	9.9	11
19	81	49	71	55	42	147	126	47	47	12	9.4	9.9
20	73	56	66	50	43	152	125	49	86	12	9.5	9.9
21	74	54	68	49	43	157	117	43	83	9.8	9.5	15
22	75	52	62	50	43	160	115	39	82	9.8	9.5	44
23	72	51	64	50	44	163	106	34	68	9.5	9.8	55
24	71	50	62	50	44	166	92	20	50	9.5	11	50
25	71	51	61	49	50	169	75	19	40	9.4	13	50
26	71	57	59	47	50	170	40	22	34	10	10	47
27	82	62	58	46	45	169	50	27	33	12	11	48
28	91	63	57	45	42	166	56	56	45	35	11	45
29	101	64	56	44	---	164	66	84	91	80	11	36
30	108	63	55	47	---	167	66	84	54	75	11	23
31	109	---	55	48	---	185	---	82	---	67	10	---
TOTAL	3538	1963	2133	1678	1377	3345	3885	1579	1994	875.0	368.6	613.8
MEAN	114	65.4	68.8	54.1	49.2	108	130	50.9	66.5	28.2	11.9	20.5
MAX	211	108	82	62	66	185	195	84	131	80	17	55
MIN	71	49	55	44	42	41	40	19	19	9.4	9.4	9.6
CFSM	1.44	.83	.87	.68	.62	1.36	1.64	.64	.84	.36	.15	.26
IN.	1.66	.92	1.00	.79	.65	1.57	1.82	.74	.94	.41	.17	.29

CAL YR 1981 TOTAL 19310.7 MEAN 52.9 MAX 211 MIN 8.3 CFSM .67 IN 9.07
WTR YR 1982 TOTAL 23349.4 MEAN 64.0 MAX 211 MIN 9.4 CFSM .81 IN 10.97

04161000 CLINTON RIVER AT AUBURN HEIGHTS, MI

LOCATION.--Lat 42°38'00", long 83°13'28", in NW¼ sec.36, T.3 N., R.10 E., Oakland County, Hydrologic Unit 04090003, on right bank 30 ft (9 m) upstream from bridge on Auburn Road at Auburn Heights, and 2.8 mi (4.5 km) upstream from Galloway Creek.

DRAINAGE AREA.--123 mi² (319 km²).

PERIOD OF RECORD.--May 1935 to June 1939 and February to September 1940 (published as "at Pontiac"), October 1956 to September 1982 (discontinued as a continuous-record station; converted to a crest-stage partial-record station).

REVISED RECORDS.--WSP 1307: 1937(M). WSP 1507: Drainage area at former site.

GAGE.--Water-stage recorder. Datum of gage is 846.50 ft (258.013 m) National Geodetic Vertical Datum of 1929. Prior to October 1940, nonrecording gage at site 3.3 mi (5.3 km) upstream at datum 876.01 ft (267.008 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for period of no gage-height record, Apr. 10 to May 19, which are fair. Some regulation by many lakes above station. Flow includes waste from city of Pontiac water supply, most of which is obtained from sources outside the basin. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years (water years 1936-38, 1957-82), 104 ft³/s (2.945 m³/s), 11.48 in/yr (292 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,780 ft³/s (50.4 m³/s) Sept. 30, 1981, gage height, 5.41 ft (1.649 m); minimum observed, 4.8 ft³/s (0.14 m³/s) Sept. 4, 1936, site then in use.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,750 ft³/s (49.6 m³/s) Oct. 1, gage height, 5.36 ft (1.634 m) was not independent of the peak discharge that occurred Sept. 30, 1981; maximum independent peak discharge, 1,030 ft³/s (29.2 m³/s) Mar. 30, gage height, 4.21 ft (1.283 m); minimum discharge, 37 ft³/s (1.05 m³/s) Aug. 25, gage height, 1.13 ft (0.344 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	940	200	145	153	104	116	326	115	246	113	79	47
2	321	185	159	134	106	120	302	130	151	167	75	47
3	266	151	175	141	107	113	300	140	144	248	74	52
4	272	156	172	247	109	109	300	188	168	188	74	47
5	278	165	163	157	112	114	300	90	198	173	65	51
6	302	166	160	150	108	106	300	90	223	108	59	84
7	300	150	150	179	105	104	300	110	167	106	57	89
8	273	144	156	131	107	108	300	120	137	103	61	66
9	283	166	137	125	107	107	299	100	139	78	59	56
10	333	211	115	123	106	106	300	100	135	87	59	56
11	323	194	118	123	106	175	300	110	134	73	57	53
12	320	187	107	123	108	192	300	105	208	67	56	53
13	289	157	108	123	101	523	320	105	203	54	61	54
14	273	69	120	134	102	229	310	100	116	55	51	120
15	260	68	127	130	110	193	290	100	112	55	47	65
16	250	69	142	127	90	244	280	90	96	66	48	55
17	237	67	128	130	69	256	260	90	76	65	48	57
18	242	65	129	130	73	235	240	85	74	59	47	70
19	201	201	122	130	154	240	230	80	157	64	47	51
20	173	279	121	130	105	229	210	75	74	61	62	53
21	168	204	129	124	106	222	200	74	78	59	48	53
22	114	185	134	119	116	220	180	96	66	58	44	58
23	98	155	135	118	116	244	170	84	161	60	47	60
24	94	90	127	105	100	240	170	89	183	57	64	57
25	97	91	120	107	87	240	180	73	208	58	157	57
26	103	103	121	106	91	248	160	72	159	144	55	60
27	227	98	122	103	109	227	140	145	104	143	53	105
28	268	89	119	105	105	227	130	241	198	234	50	110
29	236	89	117	102	---	242	120	166	116	84	49	80
30	222	99	115	102	---	370	115	195	82	110	51	77
31	210	---	133	100	---	442	---	192	---	120	48	---
TOTAL	7973	4253	4126	4011	2919	6551	7332	3462	4313	3117	1852	1943
MEAN	257	142	133	129	104	211	244	112	144	101	59.7	64.8
MAX	940	279	175	247	154	523	326	241	246	248	157	120
MIN	94	65	107	100	69	104	115	72	66	54	44	47

CAL YR 1981 TOTAL 47025 MEAN 129 MAX 940 MIN 49
WTR YR 1982 TOTAL 51852 MEAN 142 MAX 940 MIN 44

04161100 GALLOWAY CREEK NEAR AUBURN HEIGHTS, MI

LOCATION.--Lat 42°40'02", long 83°12'02", in SE¼ sec.18, T.3 N., R.11 E., Oakland County, Hydrologic Unit 04090003, on right bank 12 ft (4 m) downstream from wooden bridge on Oakland University property, and 2.7 mi (4.3 km) northeast of Auburn Heights.

DRAINAGE AREA.--17.9 mi² (46.4 km²).

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 820.78 ft (250.174 m) National Geodetic Vertical Datum of 1929 (levels by Johnson & Anderson, Inc.).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 10.0 ft³/s (0.283 m³/s), 7.59 in/yr (193 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 368 ft³/s (10.4 m³/s) June 25, 1968, gage height, 6.27 ft (1.911 m); minimum, 0.01 ft³/s (<0.001 m³/s) on many days during July and August, 1964; minimum gage height, 0.82 ft (0.250 m) Aug. 1, 1960.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 90 ft³/s (2.55 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	0400	*242	6.85	*5.71	1.740	Mar. 31	0100	123	3.48	4.84	1.475
Mar. 14	1100	206	5.83	5.41	1.649						

Minimum discharge, 1.1 ft³/s (0.031 m³/s) July 25; minimum gage height, 1.47 ft (0.448 m) on many days during August and September.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	177	11	9.2	5.7	4.0	7.3	75	8.5	23	5.8	3.2	1.9
2	99	9.8	10	5.6	4.0	7.5	50	8.2	22	3.9	2.5	1.8
3	60	9.0	8.8	5.7	4.0	6.0	56	7.6	16	7.0	2.2	1.5
4	39	8.4	8.2	18	4.0	6.0	47	7.0	12	11	2.0	1.4
5	27	8.2	7.7	13	4.0	6.0	35	6.8	10	6.8	1.8	1.3
6	20	8.6	7.1	9.0	4.0	5.9	29	6.5	8.2	5.3	1.6	1.3
7	16	8.0	7.1	6.5	4.0	5.8	24	12	6.8	3.9	1.5	1.4
8	13	7.7	7.1	5.5	4.0	5.5	29	15	5.5	2.8	1.5	1.4
9	11	7.3	6.6	5.0	4.0	5.5	33	13	4.5	2.2	1.4	1.4
10	9.6	6.9	6.1	4.6	4.0	5.6	37	10	4.1	2.5	1.3	1.3
11	8.6	6.9	5.9	4.3	4.0	10	39	8.8	3.4	4.5	1.3	1.2
12	7.8	6.6	5.7	4.2	4.0	19	39	7.6	2.8	3.4	1.3	1.2
13	7.3	6.6	5.6	4.2	4.0	122	43	7.0	2.4	2.6	1.3	1.3
14	6.9	6.4	5.6	4.1	4.0	175	36	6.3	2.1	2.2	1.2	3.9
15	6.7	6.4	5.6	4.1	4.0	127	30	5.5	3.6	2.0	1.2	3.6
16	6.7	7.3	5.4	4.1	4.1	106	38	5.0	5.8	1.9	1.2	2.8
17	6.4	6.6	5.6	4.1	4.4	111	65	4.5	4.3	1.8	1.2	2.4
18	6.9	6.2	5.1	4.0	4.7	101	45	4.1	3.4	1.6	1.2	4.8
19	6.7	6.2	4.9	4.0	5.0	93	33	5.0	17	1.5	1.2	2.8
20	6.6	12	4.8	4.0	5.4	83	29	4.3	12	1.5	1.4	2.4
21	8.2	11	4.6	4.0	5.9	81	23	3.6	14	1.3	1.2	2.1
22	11	9.8	4.8	4.0	6.4	68	20	6.8	10	1.2	1.2	2.2
23	12	8.6	5.1	4.0	7.3	61	17	6.3	7.6	1.3	1.3	2.1
24	10	7.8	4.8	4.0	7.1	58	15	5.5	5.8	1.2	1.3	2.0
25	8.8	7.3	4.8	4.0	6.6	50	14	4.8	4.5	1.2	16	2.4
26	8.0	7.5	4.8	4.0	6.7	40	13	4.5	4.5	1.5	5.8	2.5
27	17	9.4	4.9	4.0	6.7	31	12	6.5	3.7	5.0	3.9	10
28	23	8.6	4.9	4.0	6.7	26	12	22	15	18	2.8	5.3
29	17	8.0	4.9	4.0	---	25	10	22	16	10	2.4	4.1
30	14	7.5	4.9	4.0	---	37	9.1	18	9.1	7.0	2.8	3.2
31	12	---	5.1	4.0	---	101	---	15	---	4.8	2.0	---
TOTAL	683.2	241.6	185.7	163.7	137.0	1586.1	957.1	267.7	259.1	126.7	72.2	77.0
MEAN	22.0	8.05	5.99	5.28	4.89	51.2	31.9	8.64	8.64	4.09	2.33	2.57
MAX	177	12	10	18	7.3	175	75	22	23	18	16	10
MIN	6.4	6.2	4.6	4.0	4.0	5.5	9.1	3.6	2.1	1.2	1.2	1.2
CFSM	1.23	.45	.34	.30	.27	2.86	1.78	.48	.48	.23	.13	.14
IN.	1.42	.50	.39	.34	.28	3.30	1.99	.56	.54	.26	.15	.16

CAL YR 1981 TOTAL 4443.31 MEAN 12.2 MAX 177 MIN .89 CFSM .68 IN 9.23
WTR YR 1982 TOTAL 4757.10 MEAN 13.0 MAX 177 MIN 1.2 CFSM .73 IN 9.89

04161540 PAINT CREEK AT ROCHESTER, MI

LOCATION.--Lat 42°41'18", long 83°08'35", in NW¼ SE¼ sec.10, T.3 N., R.11 E., Oakland County, Hydrologic Unit 04090003, on right bank, at upstream side of bridge on Ludlow Street in Rochester, and 1.5 mi (2.4 km) upstream from mouth.

DRAINAGE AREA.--70.9 mi² (183.6 km²).

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 755.11 ft (230.158 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Ocasional regulation by Lake Orion. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 51.7 ft³/s (1.464 m³/s), 9.90 in/yr (251 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 918 ft³/s (26.0 m³/s) Feb. 1, 1968; maximum gage height, 5.95 ft (1.814 m) Feb. 10, 1965, backwater from ice; minimum discharge, 1.2 ft³/s (0.034 m³/s) Aug. 19, 1974, caused by regulation due to bridge construction; minimum gage height, 1.26 ft (0.384 m) Sept. 16, 1960.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 200 ft³/s (5.66 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	0500	*721	20.4	*4.38	1.335	Mar. 31	0700	522	14.8	3.82	1.164
Mar. 13	1800	286	8.10	3.09	0.942	Apr. 17	0600	240	6.80	2.93	0.893
Mar. 19	0500	344	9.74	3.29	1.003						

Minimum discharge, 11 ft³/s (0.31 m³/s) Aug. 19, gage height, 1.46 ft (0.445 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	601	86	72	52	40	44	230	54	111	43	18	24
2	228	83	76	52	40	44	213	48	93	41	18	24
3	159	85	69	52	40	40	251	48	81	46	18	22
4	165	87	64	51	40	39	243	50	74	46	19	22
5	161	91	63	51	40	39	214	50	66	42	18	21
6	157	87	63	51	40	40	189	49	61	39	18	21
7	146	49	64	51	40	40	169	66	56	39	18	25
8	134	54	66	51	40	40	155	72	51	37	17	66
9	123	48	63	51	40	40	156	59	49	36	17	73
10	114	45	61	51	40	41	161	59	49	37	16	66
11	105	42	59	51	40	50	163	58	46	40	16	61
12	100	42	59	51	40	62	163	59	42	38	16	57
13	93	43	51	51	40	180	187	60	40	35	15	54
14	87	46	51	51	40	240	165	59	38	35	15	55
15	79	49	52	51	40	213	149	54	49	34	15	53
16	76	54	52	50	41	218	166	53	71	33	16	52
17	76	56	50	49	41	294	214	65	51	34	16	51
18	84	57	48	48	41	300	161	57	44	33	15	55
19	78	57	48	47	42	326	140	54	80	33	14	47
20	72	80	47	46	42	297	131	50	66	34	21	44
21	79	77	48	45	43	302	119	47	64	32	17	42
22	92	68	50	44	43	275	108	59	55	31	15	41
23	88	64	56	43	44	264	101	54	49	30	16	40
24	79	62	54	42	43	258	97	49	45	29	20	39
25	76	60	53	41	40	238	93	46	43	26	69	39
26	76	62	52	41	40	208	89	39	43	31	32	39
27	102	75	52	41	43	176	78	41	42	36	27	51
28	116	70	51	40	45	159	55	75	50	46	24	42
29	95	66	51	40	---	150	54	63	57	25	24	38
30	97	64	50	40	---	189	54	68	47	21	26	38
31	90	---	52	40	---	407	---	69	---	19	25	---
TOTAL	3828	1909	1747	1465	1148	5213	4468	1734	1713	1081	631	1302
MEAN	123	63.6	56.4	47.3	41.0	168	149	55.9	57.1	34.9	20.4	43.4
MAX	601	91	76	52	45	407	251	75	111	46	69	73
MIN	72	42	47	40	40	39	54	39	38	19	14	21
CFSM	1.74	.90	.80	.67	.58	2.37	2.10	.79	.81	.49	.29	.61
IN.	2.01	1.00	.92	.77	.60	2.74	2.34	.91	.90	.57	.33	.68

CAL YR 1981 TOTAL 23636 MEAN 64.8 MAX 601 MIN 14 CFSM .91 IN 12.40
WTR YR 1982 TOTAL 26239 MEAN 71.9 MAX 601 MIN 14 CFSM 1.01 IN 13.77

04161580 STONY CREEK NEAR ROMEO, MI

LOCATION.--Lat 42°48'03", long 83°05'25", in SW¼ sec.31, T.5 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank at upstream side of bridge on Romeo Road, and 4.0 mi (6.4 km) west of Romeo.

DRAINAGE AREA.--25.6 mi² (66.3 km²).

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder. Datum of gage is 861.64 ft (262.628 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 17.3 ft³/s (0.490 m³/s), 9.18 in/yr (233 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 290 ft³/s (8.21 m³/s) Apr. 19, 1975, gage height, 5.19 ft (1.582 m); minimum, 0.92 ft³/s (0.026 m³/s) Oct. 5, 9, 1967; minimum gage height, 1.28 ft (0.390 m) July 27, 28, 1965.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft³/s (2.83 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	0900	107	3.03	3.61	1.100	Mar. 31	2100	*130	3.68	*3.98	1.213
Mar. 20	2100	106	3.00	3.68	1.122	Apr. 7	0700	106	3.00	3.78	1.152
Mar. 27	0800	100	2.83	3.66	1.116						

Minimum discharge, 2.4 ft³/s (0.068 m³/s) Aug. 21, gage height, 1.42 ft (0.433 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	82	12	19	13	9.0	12	118	9.9	24	8.2	4.1	4.1
2	66	11	19	13	9.0	12	91	9.3	35	7.1	3.7	4.4
3	51	13	17	13	9.0	12	84	9.0	31	7.9	3.6	4.4
4	52	12	16	13	9.0	12	74	8.5	28	14	3.5	3.8
5	49	12	17	13	9.0	12	57	8.3	24	13	4.1	3.6
6	45	12	15	12	9.0	11	46	8.4	20	11	3.7	3.7
7	41	12	15	12	9.0	11	62	17	17	12	4.0	4.4
8	36	18	15	11	9.0	11	57	17	11	9.4	3.9	10
9	31	18	15	10	9.0	11	48	13	9.1	8.1	3.7	8.1
10	21	17	15	9.5	9.0	11	46	11	8.9	7.3	3.4	7.2
11	12	17	15	9.0	9.0	14	44	11	8.0	8.6	3.2	6.8
12	10	16	14	9.0	9.0	17	43	10	7.5	7.6	3.0	7.8
13	9.8	20	13	9.0	9.0	43	49	9.6	7.6	6.9	2.9	7.1
14	11	28	13	9.0	9.0	43	52	9.0	7.1	6.4	2.8	9.4
15	11	29	13	9.0	9.0	44	47	9.0	9.7	6.2	2.7	7.1
16	10	27	13	9.0	9.0	57	49	8.4	13	5.7	2.8	9.5
17	9.0	23	13	9.0	9.0	77	57	8.1	11	9.5	2.8	9.0
18	12	19	12	9.0	9.5	84	47	8.5	9.7	8.5	2.7	12
19	13	17	12	9.0	10	97	39	9.6	17	7.5	2.6	7.8
20	14	26	11	9.0	10	100	36	9.0	15	8.2	2.8	6.2
21	15	24	12	9.0	10	103	32	7.9	14	5.6	2.7	7.6
22	22	20	13	9.0	11	98	28	12	20	5.3	2.8	7.8
23	20	18	14	9.0	12	93	25	14	16	5.4	3.0	7.7
24	18	21	14	9.0	12	94	23	11	13	4.4	2.7	6.8
25	16	20	14	9.0	12	89	21	11	14	4.2	13	6.3
26	15	21	14	9.0	12	78	19	10	13	4.2	6.7	6.3
27	19	29	14	9.0	12	72	13	11	12	4.4	5.0	9.7
28	23	24	14	9.0	12	55	11	26	12	6.3	4.0	10
29	16	21	14	9.0	---	51	10	34	19	5.6	4.3	7.0
30	15	18	14	9.0	---	64	10	24	11	5.4	5.2	8.6
31	13	---	13	9.0	---	125	---	18	---	4.8	4.5	---
TOTAL	777.8	575	442	308.5	275.5	1613	1338	382.5	457.6	228.7	119.9	214.2
MEAN	25.1	19.2	14.3	9.95	9.84	52.0	44.6	12.3	15.3	7.38	3.87	7.14
MAX	82	29	19	13	12	125	118	34	35	14	13	12
MIN	9.0	11	11	9.0	9.0	11	10	7.9	7.1	4.2	2.6	3.6
CFSM	.98	.75	.56	.39	.38	2.03	1.74	.48	.60	.29	.15	.28
IN.	1.13	.84	.64	.45	.40	2.34	1.94	.56	.66	.33	.17	.31

CAL YR 1981 TOTAL 5807.1 MEAN 15.9 MAX 97 MIN 1.5 CFSM .62 IN 8.44
WTR YR 1982 TOTAL 6732.7 MEAN 18.4 MAX 125 MIN 2.6 CFSM .72 IN 9.78

04161790 STONY LAKE NEAR WASHINGTON, MI

LOCATION.--Lat 42°42'58", long 83°05'58", in SE¼ sec.31, T.4 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank 1,000 ft (305 m) east of bridge over dam on Stony Creek, and 2.7 mi (4.3 km) west of Washington.

DRAINAGE AREA.--68.0 mi² (176.1 km²).

PERIOD OF RECORD.--February 1963 to current year.

REVISED RECORDS.--WDR MI-77-1: 1976.

GAGE.--Water-stage recorder. Datum of gage is 790.00 ft (240.792 m) National Geodetic Vertical Datum of 1929 (levels by Huron-Clinton Metropolitan Authority). Gage readings have been converted to elevations NGVD.

REMARKS.--Reservoir is formed by an earthfill dam with concrete spillway completed in 1962. The spillway section includes a drum gate with minimum crest elevation of 796 ft (242.6 m), maximum of 802 ft (244.4 m); and 2 sluices, one on each side, with valve controls capable of draining lake. Total capacity (new capacity table put into use Oct. 1, 1973), 4,649 acre-ft (5.73 hm³) at elevation of 802 ft (244.4 m). The reservoir began filling February 1963. Lake is used for recreational purposes.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 5,495 acre-ft (6.78 hm³) May 17, 18, 1974, Apr. 20, 1975, elevation,803.6 ft (244.94 m); minimum recorded, 1,758 acre-ft (2.17 hm³) Nov. 21, 1967, elevation, 794.7 ft (242.22 m).

EXTREMES FOR CURRENT YEAR.--Maximum contents, 5,176 acre-ft (6.38 hm³) Oct. 1, elevation, 803.01 ft (244.76 m); minimum, 3,377 acre-ft (4.16 hm³) Jan. 29, 30, 31, elevation,799.31 ft (243.63 m).

MONTHEND ELEVATION AND CONTENTS AT 2400, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

Date	Elevation (feet)	Contents (acre-feet)	Change in contents during month: Acre-feet	Change in contents during month: Equivalent in ft³/s
Sept. 30	802.3	4805	--	--
Oct. 31	801.6	4449	-356	-5.8
Nov. 30	799.5	3461	-988	-16.6
Dec. 31	799.4	3417	-44	-0.7
CAL YR 1981	--	--	-266	-0.4
Jan. 31	799.3	3373	-44	-0.7
Feb. 28	799.4	3417	+44	+0.8
Mar. 31	800.5	3913	+496	+8.1
Apr. 30	801.8	4549	+636	+10.7
May 31	802.4	4857	+308	+5.0
June 30	802.3	4805	-52	-0.9
July 31	*802.1	4701	-104	-1.7
Aug. 31	*802.2	4753	+52	+0.8
Sept. 30	*802.2	4753	0	0
WTR YR 1982	--	--	-52	-0.1

*Estimated

04161800 STONY CREEK NEAR WASHINGTON, MI

LOCATION.--Lat 42°42'55", long 83°05'31", in SW¼ sec.31, T.4 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank at downstream side bridge on Mt. Vernon Road, 500 ft (152 m) downstream from Stony Lake Dam, and 2.9 mi (4.7 km) west of Washington.

DRAINAGE AREA.--68.2 mi² (176.6 km²).

PERIOD OF RECORD.--July 1958 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 772.59 ft (235.485 m) National Geodetic Vertical Datum of 1929 (levels by Huron-Clinton Metropolitan Authority).

REMARKS.--Records good except those for the winter period, which are fair. Occasional diurnal fluctuation caused by mills above station prior to February 1963; occasional regulation by Stony Lake since (station 04161790). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--24 years, 41.9 ft³/s (1.187 m³/s), 8.34 in/yr (212 mm/yr), adjusted for storage since 1963.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 427 ft³/s (12.1 m³/s) Feb. 2, 1968, gage height, 5.86 ft (1.786 m); maximum gage height, 6.71 ft (2.045 m) Mar. 6, 1959, backwater from ice; minimum discharge, 0.9 ft³/s (0.025 m³/s) July 10, 1963; minimum gage height, 1.79 ft (0.546 m) Apr. 6, 1979; minimum daily discharge, 1.3 ft³/s (0.037 m³/s) July 31, Aug. 1, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 264 ft³/s (7.48 m³/s) Apr. 1, 2, gage height, 4.99 ft (1.521 m); minimum, 4.6 ft³/s (0.13 m³/ s) Aug. 22; minimum gage height, 2.15 ft (0.655 m) Aug. 11, 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	127	78	55	40	27	38	261	20	66	38	15	18
2	183	61	58	40	28	38	164	28	66	32	15	17
3	179	51	57	40	28	36	102	32	65	30	12	15
4	146	80	54	40	29	36	104	35	62	33	12	13
5	128	110	50	39	30	36	131	36	62	35	13	12
6	122	180	48	37	30	35	146	37	55	33	10	14
7	110	130	47	36	29	34	134	44	48	30	8.8	11
8	101	100	50	35	29	33	132	30	44	31	8.3	11
9	93	70	49	33	29	34	133	39	38	31	8.8	11
10	82	65	50	33	29	33	134	44	33	28	7.0	12
11	70	65	44	32	29	36	135	45	28	26	6.6	14
12	59	42	44	32	29	44	133	45	25	24	5.6	13
13	50	42	41	32	28	73	137	43	23	22	5.7	12
14	47	42	40	31	28	121	137	40	21	20	6.1	15
15	44	44	40	30	28	143	132	35	24	20	7.0	15
16	43	50	39	30	28	152	131	33	41	19	8.3	13
17	40	52	40	28	28	176	154	31	38	18	12	12
18	42	50	38	28	28	207	151	28	35	19	6.7	18
19	42	50	36	27	29	231	136	27	45	19	6.3	16
20	40	56	35	27	30	242	124	28	48	20	11	16
21	46	61	35	28	32	252	107	26	51	17	12	14
22	82	58	37	28	33	248	97	28	49	16	5.0	14
23	91	56	42	31	35	239	89	32	44	17	6.0	15
24	72	54	42	29	35	232	82	26	41	14	6.6	15
25	59	50	42	29	33	223	75	22	37	13	27	16
26	53	50	42	28	34	203	72	28	38	14	28	17
27	89	56	42	28	36	171	48	33	35	18	27	22
28	90	57	42	28	37	151	24	49	33	26	23	23
29	106	57	41	28	---	138	28	62	41	21	19	23
30	115	54	41	27	---	137	16	70	43	18	19	21
31	108	---	41	27	---	233	---	66	---	16	19	---
TOTAL	2659	1971	1362	981	848	4005	3449	1142	1279	718	376.8	458
MEAN	85.8	65.7	43.9	31.6	30.3	129	115	36.8	42.6	23.2	12.2	15.3
MAX	183	180	58	40	37	252	261	70	66	38	28	23
MIN	40	42	35	27	27	33	16	20	21	13	5.0	11
MEAN +	80.0	49.1	43.2	30.9	31.1	137	126	41.8	41.7	21.5	13.0	15.3
CFSM +	1.17	.72	.63	.45	.46	2.01	1.85	.61	.61	.32	.19	.22
IN +	1.35	.80	.73	.52	.48	2.32	2.06	.71	.68	.36	.22	.25

CAL YR 1981	TOTAL	17550.8	MEAN 48.1	MAX 221	MIN 5.2	MEAN +	47.7	CFSM +	.70	IN + 9.49
WTR YR 1982	TOTAL	19248.8	MEAN 52.7	MAX 261	MIN 5.0	MEAN +	52.6	CFSM +	.77	IN + 10.48

+ Adjusted for change in contents in Stony Lake.

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI

LOCATION.--Lat 42°36'52", long 83°01'36", in NE¼ SW¼ sec.3, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank at upstream side bridge on Riverland Road at Sterling Heights.

DRAINAGE AREA.--309 mi² (800 km²).

PERIOD OF RECORD.--October 1978 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 625 ft (190 m) from topographic map (nearest 5 ft).

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Oct. 15 to Dec. 4, which are fair. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,500 ft³/s (70.8 m³/s) Apr. 14, 1979; minimum, 65 ft³/s (1.84 m³/s) Sept. 7, 10, 1979, gage height, 6.77 ft (2.063 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 900 ft³/s (25.5 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	1700	*1,960	55.5	*14.90	4.542
Oct. 2	1700	1,200	34.0	12.38	3.773
Mar. 14	0400	1,360	38.5	12.89	3.929
Mar. 18	0600	1,120	31.7	12.10	3.688
Mar. 31	1300	1,570	44.5	13.60	4.145
Apr. 3	1700	1,020	28.9	11.75	3.581
Apr. 8	2400	922	26.1	11.39	3.472

Minimum discharge, 79 ft³/s (2.24 m³/s) Aug. 19, 23, gage height, 6.97 ft (2.124 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1570	470	330	300	215	224	1140	266	451	197	146	102
2	1100	420	370	290	220	246	875	301	377	240	129	101
3	850	370	370	290	220	226	867	292	336	309	127	101
4	730	400	250	430	220	225	775	203	336	305	125	101
5	679	450	347	320	220	225	716	186	311	273	123	96
6	714	530	322	300	220	225	720	180	370	226	112	114
7	698	430	317	330	220	227	706	237	338	203	107	132
8	650	390	321	270	220	224	734	246	278	192	113	148
9	632	360	326	260	220	234	738	202	282	172	106	143
10	636	410	268	260	220	226	710	210	262	155	103	138
11	625	390	264	260	220	329	720	231	241	177	99	132
12	573	350	256	260	220	380	706	220	252	149	98	129
13	529	300	248	260	220	923	758	223	276	135	96	127
14	514	200	240	260	220	1160	680	213	233	126	99	148
15	480	200	280	260	220	973	680	205	182	129	88	226
16	460	220	290	260	200	853	720	185	265	127	87	136
17	440	220	275	260	175	1040	780	184	198	135	88	129
18	460	250	270	255	180	1060	660	184	180	129	87	158
19	400	370	260	255	280	1090	600	197	320	128	82	130
20	360	520	260	255	225	1030	550	194	246	133	95	123
21	370	450	270	250	225	1030	500	184	252	122	98	121
22	360	400	280	245	225	967	419	213	210	120	85	123
23	350	350	290	240	236	961	410	205	213	120	81	131
24	310	270	280	230	228	959	394	196	290	119	92	124
25	290	260	270	220	211	905	432	175	288	113	269	122
26	290	270	265	220	213	855	406	178	267	132	143	132
27	500	290	265	215	215	713	344	200	222	251	122	232
28	600	270	260	215	233	645	287	411	254	340	115	243
29	570	270	260	215	---	639	273	373	313	184	106	173
30	540	280	260	210	---	671	268	376	221	157	113	168
31	510	---	280	210	---	1380	---	363	---	184	108	---
TOTAL	17790	10360	8844	8105	6141	20845	18568	7233	8264	5482	3442	4183
MEAN	574	345	285	261	219	672	619	233	275	177	111	139
MAX	1570	530	370	430	280	1380	1140	411	451	340	269	243
MIN	290	200	240	210	175	224	268	175	180	113	81	96
CFSM	1.86	1.12	.92	.85	.71	2.18	2.00	.75	.89	.57	.36	.45
IN.	2.14	1.25	1.06	.98	.74	2.51	2.24	.87	.99	.66	.41	.50

CAL YR 1981 TOTAL 107216 MEAN 294 MAX 1570 MIN 88 CFSM .95 IN 12.91
WTR YR 1982 TOTAL 119257 MEAN 327 MAX 1570 MIN 81 CFSM 1.06 IN 14.36

04162010 RED RUN NEAR WARREN, MI

LOCATION.--Lat 42°31'46", long 83°04'07", in SE¼ NE¼ sec.6, T.1 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank at upstream side bridge on Ryan Road, and 1.0 mi (1.6 km) northwest of Warren.

DRAINAGE AREA.--Indeterminate.

PERIOD OF RECORD.--October 1979 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 620 ft (189 m), from topographic map.

REMARKS.--Records good except those for the winter period, which are poor. Diversion from Big Beaver Creek basin via Henry-Graham Drain started in 1976, is ongoing and increasing with further development of new drains. Several observations of water temperature were made during the year. Gage-height telemark at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,940 ft³/s (83.3 m³/s) Oct. 1, 1981, gage height, 30.2 ft (9.205 m), from floodmark; minimum daily discharge, 1.1 ft³/s (0.031 m³/s) Feb. 4-20, 1980.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,100 ft³/s (31.2 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	0245	*2,940	83.3	*a30.2	9.205
Oct. 27	1945	1,470	41.6	17.33	5.282
Mar. 13	0445	1,760	49.8	19.77	6.026
June 28	2000	1,170	33.1	15.51	4.727
July 28	0500	1,980	56.1	21.52	6.559

a From floodmark.

Minimum daily discharge, 1.9 ft³/s (0.054 m³/s) May 26, June 12; minimum gage height, 8.69 ft (2.649 m) Aug. 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1540	11	38	29	2.6	11	46	4.5	26	3.8	5.2	5.2
2	128	9.6	33	10	2.6	11	28	4.1	4.8	3.0	5.3	5.4
3	32	7.8	15	12	2.6	10	191	3.9	2.5	100	5.8	3.1
4	18	7.2	11	265	2.6	11	38	3.8	2.1	10	4.2	2.3
5	15	13	8.9	56	2.6	11	22	3.8	2.4	5.1	3.9	2.1
6	13	19	7.4	34	2.6	11	21	4.0	2.2	4.6	3.6	2.4
7	7.8	8.1	7.8	24	2.6	10	26	39	2.0	4.0	4.9	2.9
8	7.3	6.3	7.4	16	2.6	9.5	31	9.5	2.2	3.6	56	2.7
9	6.7	5.7	5.7	8.0	2.6	10	50	4.4	3.6	3.6	8.7	2.7
10	6.0	5.7	5.0	6.5	2.6	10	51	3.9	4.8	12	4.3	2.2
11	5.0	6.5	4.7	6.0	2.6	340	53	3.5	2.2	24	2.8	2.3
12	4.5	6.3	4.4	5.0	2.6	191	42	3.2	1.9	12	3.2	2.3
13	4.0	6.3	4.4	4.5	2.6	1180	39	3.1	2.0	3.8	3.0	2.8
14	3.6	5.5	4.4	4.0	2.8	536	21	3.2	3.3	3.6	2.6	27
15	3.9	5.6	4.4	3.5	3.0	235	17	3.0	15	3.4	2.2	17
16	3.7	5.4	4.4	3.2	12	396	24	2.7	11	2.9	2.8	4.5
17	4.3	4.9	4.1	3.0	11	295	56	2.9	3.2	4.8	2.3	3.7
18	30	4.7	3.8	2.7	10	157	19	3.5	2.2	2.8	2.2	33
19	7.7	7.4	3.4	2.5	9.5	104	16	4.3	105	20	2.2	4.4
20	4.3	94	3.1	2.4	9.5	80	19	3.7	71	5.4	14	3.7
21	41	28	2.9	2.8	10	72	12	2.9	47	3.4	2.7	2.6
22	69	13	6.5	3.5	11	54	11	24	5.7	4.3	2.1	12
23	36	10	8.9	27	11	46	8.7	4.5	4.0	2.5	2.2	8.1
24	13	11	6.1	13	11	39	7.2	3.3	3.1	2.3	2.3	8.6
25	9.7	8.4	4.7	4.5	10	37	6.6	3.0	2.9	2.3	27	6.0
26	9.3	19	4.1	3.5	9.0	28	7.9	1.9	4.1	125	4.0	5.7
27	360	23	6.1	2.7	9.0	18	7.4	29	2.6	76	2.5	84
28	153	9.0	6.5	2.7	10	15	5.4	76	227	538	2.7	13
29	31	7.2	6.5	2.7	---	16	4.6	9.7	24	28	3.2	6.3
30	20	6.5	5.0	2.7	---	120	4.4	3.6	5.5	12	5.8	3.0
31	14	---	6.9	2.7	---	344	---	2.6	---	7.6	2.6	---
TOTAL	2600.8	375.1	244.5	565.1	172.6	4407.5	885.2	274.5	595.3	1033.8	196.3	281.0
MEAN	83.9	12.5	7.89	18.2	6.16	142	29.5	8.85	19.8	33.3	6.33	9.37
MAX	1540	94	38	265	12	1180	191	76	227	538	56	84
MIN	3.6	4.7	2.9	2.4	2.6	9.5	4.4	1.9	1.9	2.3	2.1	2.1

CAL YR 1981 TOTAL 9543.4 MEAN 26.1 MAX 1540 MIN 1.7
WTR YR 1982 TOTAL 11631.7 MEAN 31.9 MAX 1540 MIN 1.9

04162900 BIG BEAVER CREEK NEAR WARREN, MI

LOCATION.--Lat 42°32'31", long 83°02'52", in NW¼ SW¼ sec.33, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank between bridges on Mound Road, 1.0 mi (1.6 km) north of Warren, and 2.0 mi (3.2 km) upstream from mouth.

DRAINAGE AREA.--Indeterminate since 1976. Prior to 1976, 23.5 mi² (60.9 km²).

PERIOD OF RECORD.--October 1958 to current year.

GAGE.--Water-stage recorder. Datum of gage is 598.80 ft (182.514 m) Macomb County datum. Prior to Aug. 26, 1960, nonrecording gage and crest-stage gage at same site and datum.

REMARKS.--Records poor. Diversion from the basin via Henry-Graham drain started in 1976, is ongoing and increasing with further development of new drains. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,240 ft³/s (35.1 m³/s) June 26, 1968, gage height, 14.45 ft (4.404 m); no flow on several days in June and July 1962, caused by unusual regulation above gage; minimum discharge affected by diversion since 1976.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 772 ft³/s (21.9 m³/s) Oct. 1, gage height, 12.05 ft (3.673 m); minimum daily, 0.03 ft³/s (0.001 m³/s) July 25; minimum gage height, 4.80 ft (1.463 m) Jan. 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	358	1.6	1.2	.70	.40	.70	12	.28	3.1	.52	.48	.11
2	28	1.4	7.5	.80	.40	.75	2.8	.30	.95	.37	.46	.22
3	11	1.1	2.4	1.0	.39	.70	31	.29	.24	8.6	.41	.09
4	2.6	1.0	1.4	1.7	.39	.65	8.0	.29	.23	2.7	.39	.07
5	1.2	1.2	1.2	78	.39	1.3	4.9	.29	.52	.93	.34	.05
6	1.1	2.2	.99	15	.39	1.1	4.0	.35	.33	.52	.18	.07
7	.93	1.5	.83	3.5	.38	1.0	2.8	4.4	.21	.39	.12	.08
8	.71	.89	.82	1.8	.38	1.0	4.4	1.9	.14	.22	14	.06
9	.62	.79	.74	1.2	.38	1.0	8.7	.41	.14	.17	2.6	.04
10	.71	.71	.58	.90	.38	1.3	12	.36	.44	.39	.53	.04
11	.62	.80	.57	.70	.38	40	15	.44	.20	4.1	.25	.07
12	.54	.65	.55	.60	.38	76	8.6	.27	.17	4.3	.15	.06
13	.71	.62	.79	.50	.38	289	7.2	.28	.16	.65	.10	.08
14	.46	.62	.82	.45	.40	171	2.7	.32	.13	.28	.11	7.5
15	.46	.62	.81	.40	.50	104	1.6	.27	1.7	.14	.13	7.5
16	.63	.62	.60	.35	.85	112	1.5	.23	1.8	.12	.12	1.5
17	.63	.54	.74	.30	.75	91	5.8	.24	.53	.38	.13	.44
18	2.9	.59	.59	.27	.70	53	1.4	.21	.19	.23	.11	3.4
19	.98	.54	.49	.25	.65	36	.78	.29	22	5.8	.12	.69
20	.53	8.8	.42	.22	.60	22	1.1	.31	9.4	1.4	.81	.20
21	2.1	12	.40	.22	.65	21	2.7	.27	14	.31	.31	.11
22	25	2.2	.45	.39	.70	15	.86	1.7	1.0	.11	.23	.24
23	52	1.4	.50	2.0	.75	9.0	.37	.81	.57	.08	.18	.65
24	1.6	1.3	.55	3.0	.75	5.2	.34	.32	.39	.06	.15	.62
25	.98	1.0	.55	1.8	.65	4.0	.32	.26	.31	.03	3.8	.49
26	1.0	.94	.55	.70	.60	3.0	.33	.20	.30	17	.68	.28
27	50	3.3	.55	.53	.65	2.4	.31	3.7	.47	30	.27	16
28	126	2.0	.55	.48	.65	1.9	.27	33	12	134	.14	4.0
29	8.8	1.1	.55	.45	---	1.4	.44	6.9	8.5	21	.11	.49
30	3.5	.89	.55	.43	---	14	.41	.56	1.2	1.6	.26	.26
31	2.4	---	.60	.42	---	57	---	.36	---	.74	.14	---
TOTAL	686.71	52.92	29.84	119.06	14.87	1137.40	142.63	59.81	81.32	237.14	27.81	45.41
MEAN	22.2	1.76	.96	3.84	.53	36.7	4.75	1.93	2.71	7.65	.90	1.51
MAX	358	12	7.5	78	.85	289	31	33	22	134	14	16
MIN	.46	.54	.40	.22	.38	.65	.27	.20	.13	.03	.10	.04

CAL YR 1981 TOTAL 2174.83 MEAN 5.96 MAX 358 MIN .01
WTR YR 1982 TOTAL 2634.92 MEAN 7.22 MAX 358 MIN .03

04163400 PLUM BROOK AT UTICA, MI

LOCATION.--Lat 42°36'05", long 83°04'27", in SE¼ NE¼ sec.7, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank at upstream side of bridge on Ryan Road, 1.0 mi (1.6 km) southwest of Utica.

DRAINAGE AREA.--16.5 mi² (42.7 km²).

PERIOD OF RECORD.--July 1965 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 619.79 ft (188.912 m) National Geodetic Vertical Datum of 1929 (levels by Johnson & Anderson, Inc.).

REMARKS.--Records fair except those for the winter period, which are poor. Occasional diversion for sprinkler irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--17 years, 13.0 ft³/s (0.368 m³/s), 10.70 in/yr (272 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,160 ft³/s (32.9 m³/s) June 26, 1968, gage height, 10.36 ft (3.158 m); no flow part of each day July 19, 28, 1966, Aug. 22-28, Sept. 3, 11, 1969; minimum gage height, 1.23 ft (0.375 m) Sept. 16, 1967.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 200 ft³/s (5.66 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	0800	*736	20.8	9.29	2.832	Mar. 16	2200	204	5.78	6.13	1.868
Mar. 14	0400	620	17.6	*a9.49	2.893	Mar. 31	0600	393	11.1	8.03	2.448

a Ice jam.

Minimum discharge, 0.11 ft³/s (0.003 m³/s) Sept. 14, gage height, 1.63 ft (0.497 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	496	14	11	9.7	3.6	6.9	67	6.2	10	3.7	4.4	1.0
2	88	12	22	9.2	3.5	7.2	34	6.0	8.4	2.7	3.9	.72
3	27	11	13	8.1	3.5	6.5	90	5.8	5.1	6.3	3.1	.67
4	17	9.8	10	70	3.5	6.3	51	5.7	4.3	9.3	2.1	.46
5	13	9.8	8.9	40	3.5	7.4	27	5.7	4.1	5.6	1.6	.35
6	11	15	7.9	50	3.5	7.0	16	5.7	4.1	3.7	1.3	.35
7	9.7	10	7.8	32	3.5	6.7	18	10	3.3	3.1	1.1	.62
8	8.2	8.3	7.0	19	3.5	6.5	25	13	3.3	2.0	13	.59
9	7.3	7.5	6.5	13	3.5	6.8	37	8.1	3.0	1.5	6.9	.54
10	6.3	6.8	5.4	10	3.5	10	48	6.3	3.7	1.8	3.5	.40
11	5.1	6.6	4.8	8.0	3.5	30	51	5.7	2.3	3.7	2.6	.42
12	4.9	6.3	4.7	6.5	3.5	100	43	5.9	2.1	3.1	1.3	.47
13	4.9	6.8	4.9	5.5	3.5	350	41	6.2	2.2	1.9	.98	.27
14	4.6	6.5	5.2	4.5	3.7	430	25	5.0	1.8	1.6	.96	9.7
15	4.1	6.4	5.6	4.0	4.5	214	19	4.6	3.0	1.7	.77	10
16	4.4	6.6	5.2	3.7	8.0	158	19	4.2	8.7	1.5	.74	4.0
17	5.0	6.1	4.7	3.3	7.5	176	62	4.1	4.9	1.5	.62	2.7
18	8.3	5.8	4.5	3.0	6.7	139	27	3.7	3.1	1.5	.52	5.5
19	6.8	6.2	4.2	2.7	6.3	123	19	3.4	22	2.5	.89	2.9
20	5.4	25	4.2	2.5	6.2	95	18	4.7	14	2.7	1.9	1.6
21	9.5	23	4.0	3.5	6.6	96	15	4.1	15	1.2	.82	1.0
22	24	13	4.5	7.0	7.0	74	12	8.0	7.4	1.0	.55	1.9
23	27	10	5.1	15	7.2	64	11	8.4	4.9	1.0	.62	1.9
24	19	9.0	5.4	30	7.3	54	9.4	5.1	4.0	1.0	.54	1.8
25	15	8.0	5.2	10	5.8	43	8.3	4.1	3.7	1.0	6.4	1.6
26	13	8.0	5.0	5.0	5.9	30	8.9	8.4	4.3	3.1	3.8	1.6
27	39	12	5.1	4.2	6.0	22	8.7	5.8	3.4	16	1.6	10
28	94	9.1	5.6	4.0	6.4	18	7.7	40	6.4	81	.98	8.2
29	32	7.8	5.3	3.9	---	18	6.9	23	11	23	.72	3.4
30	20	7.2	5.1	3.8	---	29	6.3	12	5.7	12	1.3	2.0
31	16	---	5.6	3.7	---	258	---	7.8	---	6.1	1.7	---
TOTAL	1045.5	293.6	203.4	444.8	140.7	2592.3	831.2	246.7	179.2	207.8	71.21	76.66
MEAN	33.7	9.79	6.56	14.3	5.03	83.6	27.7	7.96	5.97	6.70	2.30	2.56
MAX	496	25	22	90	8.0	430	90	40	22	81	13	10
MIN	4.1	5.8	4.0	2.5	3.5	6.3	6.3	3.4	1.8	1.0	.52	.27
CFSM	2.04	.59	.40	.87	.31	5.07	1.68	.48	.36	.41	.14	.16
IN.	2.36	.66	.46	1.00	.32	5.84	1.87	.56	.40	.47	.16	.17

CAL YR 1981 TOTAL 5284.60 MEAN 14.5 MAX 496 MIN .63 CFSM .88 IN 11.91
WTR YR 1982 TOTAL 6333.07 MEAN 17.4 MAX 496 MIN .27 CFSM 1.06 IN 14.28

04163900 RED RUN NEAR CADY, MI

LOCATION.--Lat 42°34'08", long 82°58'14", in SW¼ SW¼ sec.19, T.2 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank 50 ft (15 m) upstream from bridge on Utica Road, 200 ft (61 m) upstream from mouth, 550 ft (168 m) downstream from Plum Brook, and 0.7 mi (1.1 km) northwest of Cady.

PERIOD OF RECORD.--October 1979 to September 1982 (gage heights only) (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 585 ft (178 m) from topographic map (nearest 5 ft).

REMARKS.--Records fair.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 23.34 ft (7.114 m) Oct. 1, 1981, from floodmark; minimum, 6.65 ft (2.027 m) Aug. 24, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 23.34 ft (7.114 m) Oct. 1, from floodmark; minimum gage height recorded, 6.66 ft (2.030 m) Aug. 19.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	9.56	8.84	8.61	7.91	8.29	14.20	8.20	9.21	7.80	---	6.93
2	---	9.28	9.70	8.34	7.86	8.35	12.25	8.50	9.20	8.00	---	6.96
3	---	9.00	8.78	8.14	7.91	8.04	12.52	8.50	8.70	9.40	---	6.93
4	---	8.78	8.68	10.79	7.90	7.84	12.01	8.00	8.50	9.00	---	6.90
5	---	9.00	8.55	10.27	7.93	8.08	10.92	7.80	8.40	8.10	---	6.70
6	---	9.30	8.43	9.22	7.95	8.17	10.72	7.80	8.80	7.90	---	6.80
7	---	9.06	8.37	9.01	7.88	8.00	10.78	8.32	8.60	7.70	---	7.20
8	---	8.98	8.36	8.65	8.07	7.88	10.82	8.66	8.20	7.70	---	7.25
9	---	8.51	8.34	8.34	7.95	7.95	11.26	7.88	8.10	7.50	---	7.26
10	9.81	8.53	8.15	8.36	7.92	8.00	11.37	7.85	8.10	7.40	---	7.21
11	9.74	8.54	8.02	9.46	7.87	11.29	11.27	7.85	7.90	7.90	---	7.16
12	9.57	8.44	7.97	9.28	7.88	11.83	11.17	7.82	8.00	7.60	---	7.12
13	9.45	8.35	7.89	8.63	7.93	17.13	11.15	7.84	8.20	7.30	---	7.05
14	9.26	8.09	7.85	8.32	7.88	16.05	10.54	7.80	8.00	7.10	---	8.10
15	9.12	7.71	7.93	8.20	7.91	14.62	10.50	7.70	7.70	7.10	---	9.70
16	9.03	7.75	7.99	8.15	8.65	14.53	10.40	7.60	8.70	7.10	---	7.59
17	8.90	7.81	8.02	8.13	8.38	14.24	11.70	7.60	7.90	7.40	---	7.24
18	9.60	7.78	7.95	8.45	7.93	13.87	11.50	7.60	7.60	7.10	---	8.01
19	8.99	7.96	7.74	8.46	7.90	13.42	10.60	7.62	9.50	7.60	6.70	7.36
20	8.64	10.45	7.83	8.15	8.33	13.06	10.30	7.68	9.10	7.40	7.11	7.10
21	9.06	9.80	7.77	8.07	8.26	12.80	9.60	7.54	9.90	7.10	6.94	7.10
22	10.20	8.94	8.01	8.02	8.34	12.43	9.30	8.25	8.10	7.00	6.74	7.20
23	9.86	8.68	8.28	8.67	8.60	12.16	9.20	7.93	7.90	7.00	6.73	7.40
24	8.93	8.37	8.24	8.30	8.60	12.02	9.10	7.73	8.30	6.90	6.79	7.30
25	8.54	8.07	7.87	7.95	7.93	11.87	9.30	7.54	8.30	---	8.72	7.20
26	8.51	8.21	7.86	7.88	7.82	11.46	9.20	7.51	8.20	---	7.54	7.20
27	11.10	9.05	7.96	7.83	8.01	10.87	8.90	8.51	7.90	---	7.13	9.00
28	13.63	8.19	7.98	7.86	8.13	10.35	8.60	10.69	9.10	---	7.05	8.30
29	10.76	8.08	7.93	7.89	---	10.25	8.40	9.54	10.30	---	6.97	7.70
30	10.04	8.05	7.85	7.80	---	11.45	8.40	8.80	8.10	---	7.11	7.50
31	9.81	---	7.68	7.85	---	14.50	---	8.70	---	---	7.03	---
MEAN	---	8.61	8.16	8.49	8.06	11.32	10.53	8.11	8.48	---	---	7.42
MAX	---	10.45	9.70	10.79	8.65	17.13	14.20	10.69	10.30	---	---	9.70
MIN	---	7.71	7.68	7.80	7.82	7.84	8.40	7.51	7.60	---	---	6.70

04164000 CLINTON RIVER NEAR FRASER, MI

LOCATION.--Lat 42°34'40", long 82°57'00", in NW¼ sec.20, T.2 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank 800 ft (244 m) downstream from bridge on Garfield Road, 2.8 mi (4.5 km) north of Fraser, and 4.0 mi (6.4 km) upstream from North Branch.

DRAINAGE AREA.--444 mi² (1,150 km²).

PERIOD OF RECORD.--May 1947 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 577.71 ft (176.086 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 17, 1949, nonrecording gage at site 800 ft (244 m) upstream at same datum.

REMARKS.--Records good. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--35 years, 373 ft³/s (10.56 m³/s), 11.41 in/yr (290 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,840 ft³/s (250 m³/s) Oct. 1, 1981, gage height, 19.56 ft (5.962 m); minimum, 47 ft³/s (1.33 m³/s) Sept. 6, 1955; minimum gage height, 4.29 ft (1.308 m) Sept. 7, 1954.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 5 or 6, 1947, reached a stage of 20 ft (6.1 m), from floodmarks, discharge, 9,000 ft³/s (255 m³/s).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 2,000 ft³/s (56.6 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	0830	*8,840	250	*19.56	5.962
Oct. 27	2400	2,940	83.3	14.51	4.423
Mar. 13	1900	4,710	133	16.45	5.014
Mar. 16	2000	2,430	68.8	13.79	4.203
Mar. 31	2300	2,350	66.6	13.65	4.161
July 28	unknown	3,090	87.5	14.77	4.502

Minimum discharge, 105 ft³/s (2.97 m³/s) Aug. 19, gage height, 5.17 ft (1.576 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6690	614	432	439	276	339	1910	303	508	257	230	148
2	3560	554	602	346	267	364	1250	344	495	288	200	152
3	1680	499	430	346	263	303	1290	341	400	574	190	148
4	1080	459	412	1030	262	268	1120	276	389	481	180	139
5	903	501	391	849	265	308	835	245	359	347	180	125
6	901	548	371	535	265	325	787	239	418	295	170	141
7	817	505	363	466	288	295	792	342	394	257	160	182
8	760	470	363	403	332	276	807	401	325	246	270	197
9	686	400	358	364	303	288	901	267	310	222	180	198
10	667	401	327	349	280	296	934	262	310	201	160	191
11	653	403	298	503	270	1040	946	262	278	276	150	183
12	620	383	293	586	270	1120	894	257	283	236	140	178
13	596	364	285	490	260	3550	903	262	317	185	140	170
14	562	313	283	328	260	3130	844	243	291	162	140	479
15	533	248	293	315	270	2320	745	234	242	166	130	576
16	512	251	301	310	385	2030	699	214	414	162	130	237
17	488	260	308	280	298	2060	1000	215	270	197	130	191
18	618	256	290	260	252	1840	966	212	230	167	130	317
19	505	276	251	290	273	1670	754	233	586	243	120	202
20	442	738	276	270	332	1520	703	246	481	206	171	182
21	497	642	260	280	330	1420	580	224	655	164	149	179
22	729	455	322	276	351	1330	507	334	303	156	118	185
23	699	409	356	401	394	1240	473	301	270	156	116	216
24	494	354	339	330	356	1190	455	260	339	148	124	205
25	421	301	281	300	280	1140	486	234	339	170	435	189
26	412	305	290	270	263	1080	468	225	334	410	248	191
27	981	475	307	260	293	917	425	349	281	520	179	510
28	1850	323	315	260	323	785	359	814	510	1500	166	394
29	913	303	300	252	---	740	322	586	765	360	153	257
30	725	300	285	245	---	785	328	441	320	260	174	236
31	669	---	280	256	---	2060	---	425	---	280	164	---
TOTAL	31663	12310	10262	11889	8261	36029	23483	9591	11416	9292	5327	6898
MEAN	1021	410	331	384	295	1162	783	309	381	300	172	230
MAX	6690	738	602	1030	394	3550	1910	814	765	1500	435	576
MIN	412	248	251	245	252	268	322	212	230	148	116	125
CFSM	2.30	.92	.75	.87	.66	2.62	1.76	.70	.86	.68	.39	.52
IN.	2.65	1.03	.86	1.00	.69	3.02	1.97	.80	.96	.78	.45	.58

CAL YR 1981 TOTAL 158440 MEAN 434 MAX 6690 MIN 121 CFSM .98 IN 13.27
WTR YR 1982 TOTAL 176421 MEAN 483 MAX 6690 MIN 116 CFSM 1.09 IN 14.78

04164100 EAST POND CREEK AT ROMEO, MI

LOCATION.--Lat 42°49'21", long 83°01'13", in NE¼ SE¼ sec.27, T.5 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank at upstream side bridge on State Highway 53, and 1.4 mi (2.3 km) north of Romeo.

DRAINAGE AREA.--21.8 mi² (56.5 km²).

PERIOD OF RECORD.--September 1958 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 780 ft (238 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period and those for periods of no gage-height record, Jan. 17 to Mar. 3, and Apr. 1 to May 26, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--24 years, 15.4 ft³/s (0.436 m³/s), 9.59 in/yr (244 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 358 ft³/s (10.1 m³/s) Feb. 10, 1965, gage height, 4.48 ft (1.366 m); maximum gage height, 4.56 ft (1.390 m) Mar. 12, 1962, backwater from ice; minimum discharge, 0.8 ft³/s (0.023 m³/s) July 30, 31, 1964, Aug. 6, 7, 1965; minimum gage height, 0.71 ft (0.216 m) July 21, 1959.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 80 ft³/s (2.27 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	1300	*196	5.55	*3.34	1.018	Mar. 31	0500	129	3.65	2.78	0.847
Mar. 14	1900	109	3.09	2.59	0.789	July 4	1000	83	2.35	2.32	0.707

Minimum daily discharge, 3.3 ft³/s (0.093 m³/s) Aug. 15-19, 21, 22, 24, Sept. 7; minimum gage height, 0.96 ft (0.293 m) Sept. 6, 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	151	19	18	12	8.8	11	93	13	20	8.3	4.8	8.0
2	110	17	22	13	9.0	12	75	12	20	7.2	4.8	8.5
3	66	17	19	13	9.0	13	70	12	17	6.9	4.8	8.0
4	55	16	18	13	9.0	13	70	12	16	58	4.8	7.3
5	44	16	17	13	9.0	13	65	12	14	43	4.8	7.3
6	43	16	16	13	9.0	12	60	12	14	25	4.4	3.6
7	41	13	16	12	9.0	11	50	15	12	20	4.8	3.3
8	36	12	17	12	9.0	10	46	17	11	17	5.1	3.6
9	33	10	16	12	9.0	11	45	16	9.3	15	5.5	4.2
10	29	10	15	12	9.0	12	48	15	9.1	13	4.2	4.2
11	27	10	14	11	9.0	13	50	14	8.2	13	3.9	4.2
12	25	10	13	11	9.0	15	50	14	7.4	12	3.8	4.1
13	21	10	13	10	9.0	25	56	14	7.1	9.0	3.6	3.9
14	23	10	13	10	9.0	75	48	14	5.3	8.0	3.4	4.1
15	21	11	13	9.5	9.0	60	44	14	7.9	9.0	3.3	4.4
16	20	11	13	9.5	9.0	70	50	13	13	8.5	3.3	4.4
17	18	11	12	9.0	9.0	88	60	13	11	9.0	3.3	5.8
18	19	11	11	9.0	9.0	89	50	13	8.9	9.5	3.3	8.5
19	19	11	10	8.5	9.2	88	42	13	17	9.5	3.3	6.9
20	18	18	11	8.4	9.4	85	35	12	16	9.5	3.4	6.6
21	18	20	9.7	8.4	9.8	86	32	12	14	8.0	3.3	6.2
22	23	17	12	8.4	10	82	30	14	13	7.3	3.3	6.6
23	23	16	13	8.4	11	79	27	13	11	6.9	3.4	7.3
24	20	16	15	8.4	11	75	25	12	9.7	6.2	3.3	8.0
25	18	15	13	8.4	11	70	23	12	8.6	5.5	26	8.5
26	17	15	12	8.4	11	62	20	13	9.4	5.5	14	8.5
27	21	20	12	8.4	11	49	18	14	8.7	5.8	9.5	12
28	32	17	12	8.4	11	48	17	21	9.9	10	8.0	11
29	24	17	12	8.4	---	44	15	23	19	8.0	7.6	9.5
30	22	17	12	8.4	---	50	14	18	12	6.6	8.5	9.5
31	20	---	11	8.6	---	116	---	17	---	5.8	7.6	---
TOTAL	1057	429	430.7	313.5	266.2	1488	1328	439	360.5	386.0	177.1	198.0
MEAN	34.1	14.3	13.9	10.1	9.51	48.0	44.3	14.2	12.0	12.5	5.71	6.60
MAX	151	20	22	13	11	116	93	23	20	58	26	12
MIN	17	10	9.7	8.4	8.8	10	14	12	6.3	5.5	3.3	3.3
CFSM	1.56	.66	.64	.46	.44	2.20	2.03	.65	.55	.57	.26	.30
IN.	1.80	.73	.73	.53	.45	2.54	2.27	.75	.62	.66	.30	.34

CAL YR 1981 TOTAL 6247.8 MEAN 17.1 MAX 151 MIN 2.2 CFSM .78 IN 10.66
WTR YR 1982 TOTAL 6873.0 MEAN 18.8 MAX 151 MIN 3.3 CFSM .86 IN 11.73

04164300 EAST BRANCH COON CREEK AT ARMADA, MI

LOCATION.--Lat 42°50'45", long 82°53'06", in NE¼ sec.23, T.5 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on right bank at downstream side of bridge on Prospect Street in Armada.

DRAINAGE AREA.--13.0 mi² (33.7 km²).

PERIOD OF RECORD.--October 1958 to current year.

GAGE.--Water-stage recorder and concrete control. Altitude of gage is 735 ft (224 m) from topographic map (nearest 5 ft).

REMARKS.--Records good except those for periods of no gage-height record, Oct. 1 to Nov. 24 and Dec. 20 to Mar. 2, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--24 years, 6.58 ft³/s (0.186 m³/s), 6.87 in/yr (174 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 910 ft³/s (25.8 m³/s) Apr. 19, 1975, gage height, 6.69 ft (2.039 m); no flow Jan. 25 to Feb. 10, 1961, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft³/s (2.83 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	unknown	*470	13.3	unknown		Mar. 17	2000	164	4.64	3.66	1.116
Mar. 13	2000	462	13.1	5.22	1.591	Mar. 18	2300	126	3.57	3.37	1.027
Mar. 14	2000	342	9.69	4.68	1.426	Mar. 31	0200	443	12.5	5.14	1.567
Mar. 15	1900	211	5.98	3.97	1.210	Apr. 3	1400	122	3.46	3.28	1.000
Mar. 16	2100	213	6.03	3.98	1.213	Apr. 17	0600	150	4.25	3.51	1.070

Minimum discharge, 0.03 ft³/s (0.001 m³/s) Aug. 14, 15, 17; minimum gage height, 1.60 ft (0.488 m) Aug. 17, 18.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	240	8.0	5.1	1.7	.77	.95	44	1.7	1.9	1.2	.12	.20
2	120	6.0	15	1.6	.77	.95	22	1.5	1.8	.80	.12	.11
3	55	4.5	10	2.0	.77	.95	54	1.4	1.3	.69	.12	.07
4	40	4.0	6.5	5.0	.77	.95	22	1.2	1.2	1.6	.12	.06
5	30	3.5	4.8	15	.77	1.0	10	1.1	1.1	1.7	.09	.06
6	20	5.0	3.9	11	.77	.95	4.6	1.1	.96	1.5	.09	.07
7	25	5.5	3.9	9.0	.77	.95	7.1	1.5	.83	1.2	.09	.07
8	19	3.7	3.9	4.5	.77	.97	7.6	2.1	.57	.91	.09	.08
9	7.0	3.0	3.1	2.4	.77	.95	11	1.6	.51	.69	.09	.07
10	4.5	2.4	2.6	1.7	.77	.95	16	1.4	.48	.61	.09	.07
11	3.5	2.2	2.1	1.2	.77	2.1	19	1.2	.38	.61	.09	.07
12	2.7	2.0	1.9	.95	.77	2.8	29	1.1	.29	.54	.09	.07
13	2.3	1.9	1.7	.90	.77	187	60	.98	.18	.48	.07	.09
14	2.0	1.8	1.7	.85	.77	231	25	.90	.16	.39	.03	.42
15	1.8	1.7	1.9	.80	.77	174	14	.79	.37	.37	.03	.10
16	1.7	1.6	1.7	.80	.77	150	13	.79	.63	.28	.05	.08
17	1.7	1.5	1.7	.77	.77	158	83	.68	1.2	.40	.05	.12
18	2.0	1.4	1.5	.77	.78	110	22	.61	.82	.26	.05	.27
19	2.3	1.4	1.3	.77	.80	88	11	.52	1.7	.28	.07	.05
20	2.0	3.0	1.2	.77	.80	58	8.5	.51	1.4	.24	.11	.06
21	2.0	18	1.1	.77	.82	58	6.7	.48	1.4	.18	.18	.05
22	5.0	11	1.2	.77	.83	43	5.1	.93	1.2	.20	.15	.17
23	16	7.0	1.3	.77	.85	39	4.3	.91	1.0	.24	.20	.10
24	10	4.0	1.4	.77	.88	39	3.9	.83	.76	.23	.14	.11
25	6.5	3.6	1.3	.77	.89	29	3.3	.74	.64	.27	1.9	.15
26	5.0	3.9	1.3	.77	.90	21	3.1	.64	.60	.19	.09	.18
27	6.0	10	1.4	.77	.92	12	2.7	.81	.51	.17	.07	.67
28	46	8.4	1.4	.77	.94	8.5	2.2	1.5	.82	.25	.07	.11
29	35	5.4	1.4	.77	---	9.2	2.1	1.4	1.1	.12	.08	.09
30	20	4.2	1.3	.77	---	36	1.8	1.5	1.8	.12	.11	.16
31	12	---	1.5	.77	---	215	---	1.7	---	.12	.08	---
TOTAL	746.0	139.6	90.1	71.95	22.50	1680.17	518.0	34.12	27.61	16.84	4.73	3.98
MEAN	24.1	4.65	2.91	2.32	.80	54.2	17.3	1.10	.92	.54	.15	.13
MAX	240	18	15	15	.94	231	83	2.1	1.9	1.7	1.9	.67
MIN	1.7	1.4	1.1	.77	.77	.95	1.8	.48	.16	.12	.03	.05
CFSM	1.85	.36	.22	.18	.06	4.17	1.33	.09	.07	.04	.01	.01
IN.	2.13	.40	.26	.21	.06	4.81	1.48	.10	.08	.05	.01	.01

CAL YR 1981 TOTAL 3245.20 MEAN 8.89 MAX 275 MIN .06 CFSM .68 IN 9.29
WTR YR 1982 TOTAL 3355.60 MEAN 9.19 MAX 240 MIN .03 CFSM .71 IN 9.60

04164500 NORTH BRANCH CLINTON RIVER NEAR MOUNT CLEMENS, MI

LOCATION.--Lat 42°37'45", long 82°53'25", in SW¼ sec.35, T.3 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank 30 ft (9 m) upstream from bridge on State Highway 59, 2 mi (3 km) north of Mount Clemens, and 3.6 mi (5.8 km) upstream from mouth.

DRAINAGE AREA.--199 mi² (515 km²).

PERIOD OF RECORD.--May 1947 to current year.

REVISED RECORDS.--WSP 1437: 1948. WSP 1557: Drainage area.

GAGE.--Water-stage recorder. Concrete control since September 1961. Datum of gage is 576.38 ft (175.681 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Nov. 15, 1949, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Some regulation at times by mill above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--35 years, 122 ft³/s (3.455 m³/s), 8.33 in/yr (212 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,700 ft³/s (190 m³/s) Feb. 2, 1968, gage height, 18.62 ft (5.675 m); minimum, 0.2 ft³/s (0.006 m³/s) Sept. 13, 14, 1954, July 30, 1965; minimum gage height, 3.12 ft (0.951 m) Sept. 13, 14, 1954.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 5 or 6, 1947, reached a stage of 20.0 ft (6.10 m), from floodmark.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft³/s (34.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 2	1500	*4,500	127	*16.40	4.999	Apr. 1	0300	3,340	94.6	15.11	4.606
Mar. 15	2100	4,210	119	16.08	4.901						

Minimum discharge, 2.1 ft³/s (0.059 m³/s) Aug. 19, gage height, 3.95 ft (1.204 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	817	205	110	53	31	45	2840	62	50	52	13	15
2	3790	159	271	59	31	47	1120	59	63	43	13	13
3	3130	135	362	55	31	49	642	57	78	34	11	14
4	1070	118	246	91	31	51	662	55	63	40	11	13
5	542	109	163	282	31	53	629	53	55	58	11	12
6	308	111	124	379	31	55	308	52	48	70	11	12
7	236	122	106	260	31	56	213	57	44	90	10	11
8	261	111	102	170	31	58	249	76	41	77	12	9.3
9	215	96	97	100	31	60	279	93	39	57	11	6.6
10	152	85	76	70	31	62	374	76	37	45	11	7.3
11	123	79	99	52	31	85	486	66	34	41	7.8	6.7
12	107	75	73	40	31	155	560	60	29	40	5.3	7.7
13	96	71	65	38	31	571	678	57	28	34	5.1	7.1
14	85	68	63	35	31	2270	802	54	28	28	4.7	8.2
15	81	67	63	34	31	4050	632	49	28	25	4.8	14
16	77	66	72	33	31	3600	358	46	30	23	5.0	9.2
17	73	66	58	32	32	2930	343	44	32	21	4.5	9.3
18	71	64	51	32	32	2750	604	40	35	21	2.7	9.8
19	78	62	43	31	33	2140	574	37	40	24	2.2	13
20	84	71	48	31	33	1540	304	37	60	22	2.7	14
21	79	223	42	31	34	1160	218	36	74	20	3.5	13
22	106	296	39	31	35	1060	171	32	60	17	4.2	12
23	284	192	44	31	36	938	137	39	50	15	3.8	12
24	323	131	48	31	37	865	110	49	42	15	3.5	13
25	223	107	47	31	39	811	90	49	38	14	6.2	13
26	152	97	46	31	40	702	82	45	34	14	43	14
27	157	105	49	31	42	549	76	42	32	14	38	16
28	531	185	50	31	43	356	72	45	36	18	22	22
29	648	175	51	31	---	268	68	50	50	19	16	24
30	595	123	50	31	---	270	64	58	70	18	15	21
31	341	---	45	31	---	1150	---	51	---	14	15	---
TOTAL	14835	3574	2803	2218	932	28756	13745	1626	1348	1023	329.0	372.2
MEAN	479	119	90.4	71.5	33.3	928	458	52.5	44.9	33.0	10.6	12.4
MAX	3790	296	362	379	43	4050	2840	93	78	90	43	24
MIN	71	62	39	31	31	45	64	32	28	14	2.2	6.6
CFSM	2.41	.60	.45	.36	.17	4.66	2.30	.26	.23	.17	.05	.06
IN.	2.77	.67	.52	.41	.17	5.38	2.57	.30	.25	.19	.06	.07

CAL YR 1981 TOTAL 58113.4 MEAN 159 MAX 3790 MIN 4.7 CFSM .80 IN 10.86
WTR YR 1982 TOTAL 71561.2 MEAN 196 MAX 4050 MIN 2.2 CFSM .99 IN 13.38

04164800 MIDDLE BRANCH CLINTON RIVER AT MACOMB, MI

LOCATION.--Lat 42°42'23", long 82°57'33", in SW¼ sec.5, T.3 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank at downstream side of bridge on Romeo Plank Road, 0.4 mi (0.6 km) north of Macomb.

DRAINAGE AREA.--41.0 mi² (106.2 km²).

PERIOD OF RECORD.--Water years 1959-62, 1969 (annual maximum and occasional low-flow measurements), October 1962 to September 1968, October 1969 to Sept. 1982 (discontinued as a continuous-record station; converted to a crest-stage partial record station).

GAGE.--Water-stage recorder. Datum of gage is 603.23 ft (183.865 m) National Geodetic Vertical Datum of 1929 (levels by Corps of Engineers). Oct. 28, 1958, to Nov. 14, 1962, and Oct. 12, 1968, to Dec. 17, 1969, crest-stage gage at same site and datum.

REMARKS.--Records good except those for the winter period and period of no gage-height record, Feb. 3 to Mar. 13, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 27.5 ft³/s (0.779 m³/s), 9.11 in/yr (231 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,580 ft³/s (44.7 m³/s) June 26, 1968; maximum gage height, 16.16 ft (4.926 m) Mar. 12, 1962, backwater from ice; minimum discharge, 0.10 ft³/s (0.003 m³/s) July 22, 1971; minimum gage height, 4.68 ft (1.426 m) July 11, 1964.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 300 ft³/s (8.50 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	1100	894	25.3	12.36	3.767	Mar. 31	0500	*1,140	32.3	*13.70	4.176
Mar. 14	1900	991	28.1	12.90	3.932	Apr. 3	1200	394	11.2	8.68	2.646
Mar. 17	2100	466	13.2	9.24	2.816	July 4	1000	346	9.80	8.30	2.530
Mar. 19	0100	344	9.74	8.27	2.521						

Minimum discharge, 0.93 ft³/s (0.026 m³/s) Aug. 18, gage height, 4.93 ft (1.503 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	644	25	36	17	10	14	119	20	36	13	4.1	2.8
2	106	23	58	18	10	15	61	18	26	10	3.7	3.1
3	46	20	37	20	10	15	195	17	17	13	3.4	2.2
4	33	19	30	27	10	16	78	17	16	156	3.4	2.0
5	28	21	26	70	10	17	39	17	14	42	3.1	1.7
6	25	24	24	50	10	17	23	16	12	21	2.8	2.0
7	23	19	24	40	10	17	41	28	11	15	2.5	3.4
8	20	17	23	30	10	18	48	31	10	11	2.5	2.5
9	17	16	22	22	10	19	69	22	9.4	8.3	3.4	2.2
10	17	14	20	18	10	20	93	18	9.4	7.9	2.2	2.0
11	16	14	18	15	10	25	112	17	7.7	10	2.2	2.0
12	15	14	16	13	10	90	132	16	6.5	8.4	2.0	1.7
13	14	14	15	12	10	300	161	15	6.5	6.6	1.7	1.5
14	13	14	16	11	10	803	100	13	6.3	5.8	1.7	2.0
15	13	16	16	11	10	559	58	13	37	6.4	1.3	3.4
16	13	14	15	11	10	334	55	13	38	6.1	1.7	3.4
17	13	14	14	11	10	379	166	12	15	6.2	1.5	3.1
18	19	13	14	10	10	295	75	11	11	6.1	1.3	6.8
19	17	13	14	10	11	256	52	11	53	5.6	1.3	3.4
20	15	53	14	10	11	205	48	12	26	6.1	2.0	3.1
21	19	52	14	10	11	201	36	10	25	4.5	2.0	2.8
22	40	33	13	10	11	154	32	19	20	3.9	1.5	3.1
23	44	27	13	10	11	133	30	15	15	4.0	2.1	4.5
24	29	24	13	10	12	113	28	12	12	3.2	2.3	3.7
25	25	22	14	10	12	85	26	11	9.7	3.1	21	4.1
26	22	22	14	10	13	62	26	15	12	3.4	4.5	3.7
27	55	40	14	10	13	37	25	16	11	6.1	3.0	12
28	110	29	15	10	14	29	22	51	27	14	2.8	7.4
29	49	24	15	10	---	29	21	34	45	6.2	2.5	4.5
30	34	22	15	10	---	100	21	23	19	4.5	4.5	3.7
31	28	---	16	10	---	641	---	19	---	4.1	3.7	---
TOTAL	1562	672	608	536	299	4998	1992	562	563.5	421.5	97.7	103.8
MEAN	50.4	22.4	19.6	17.3	10.7	161	66.4	18.1	18.8	13.6	3.15	3.46
MAX	644	53	58	70	14	803	195	51	53	156	21	12
MIN	13	13	13	10	10	14	21	10	6.3	3.1	1.3	1.5
CFSM	1.23	.55	.48	.42	.26	3.93	1.62	.44	.46	.33	.08	.08
IN.	1.42	.61	.55	.49	.27	4.53	1.81	.51	.51	.38	.09	.09

CAL YR 1981 TOTAL 11365.9 MEAN 31.1 MAX 836 MIN 1.1 CFSM .76 IN 10.31
WTR YR 1982 TOTAL 12415.5 MEAN 34.0 MAX 803 MIN 1.3 CFSM .83 IN 11.26

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI
(National stream-quality accounting network and pesticide station)

LOCATION.--Lat 42°35'45", long 82°54'35", Macomb County, Hydrologic Unit 04090003, on left bank 10 ft (3 m) downstream from bridge on Moravian Drive, 0.2 mi (0.3 km) downstream from North Branch, and 0.5 mi (0.8 km) west of Mount Clemens.

DRAINAGE AREA.--734 mi² (1,901 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1934 to current year.

REVISED RECORDS.--WSP 1084: 1943, 1945-46. WSP 1937: 1935, 1936(M), 1937-39, 1949(M), 1950. WSP 1557: Drainage area. WSP 1727: 1952(M), 1954(M).

GAGE.--Water-stage recorder. Datum of gage is 570.43 ft (173.867 m) National Geodetic Vertical Datum of 1929. May 10, 1934, to Jan. 11, 1939, nonrecording gage at same site and datum. Auxiliary gage is a water-stage recorder on right bank 2.0 mi (3.2 km) downstream from base gage at same datum. Mar. 15, 1938, to Jan. 3, 1952, auxiliary nonrecording gage 1.6 mi (2.6 km) downstream from base gage at same datum.

REMARKS.--Water-discharge records fair. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--48 years, 530 ft³/s (15.01 m³/s), 9.81 in/yr (249 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 21,200 ft³/s (600 m³/s) Apr. 6, 1947, gage height, 23.55 ft (7.178 m), from flood-mark; minimum not determined; minimum gage height, 2.72 ft (0.829 m) Nov. 29, 1963.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,000 ft³/s (85.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	1400	*9,920	281	*15.81	4.819	Mar. 15	0200	7,030	199	13.60	4.145
Oct. 28	0400	3,210	90.9	9.58	2.920	Apr. 1	0500	5,540	157	12.19	3.716
Mar. 13	2300	6,880	195	13.46	4.103						

Minimum daily discharge, 130 ft³/s (3.68 m³/s) Aug. 23; minimum gage height, 5.04 ft (1.536 m) Dec. 19.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7610	869	632	513	340	416	4920	410	620	350	260	175
2	7400	756	1050	450	330	476	2820	450	620	360	230	175
3	4500	666	873	450	320	395	2200	430	520	660	220	175
4	2370	640	735	1260	320	360	2110	370	490	727	210	170
5	1470	680	636	1350	330	400	1680	340	460	942	210	150
6	1200	714	560	1030	330	405	1230	320	510	410	200	165
7	1060	665	533	879	350	360	1130	450	470	380	180	210
8	1000	613	534	675	400	350	1200	540	400	350	300	220
9	886	514	509	540	360	325	1340	410	380	310	260	220
10	850	540	431	470	340	350	1540	380	380	270	190	210
11	840	540	440	593	330	1200	1700	370	340	340	170	205
12	800	500	420	700	330	1530	1720	350	340	300	155	200
13	750	456	400	480	320	4090	1880	350	430	240	155	190
14	710	409	420	400	320	5950	1860	330	350	210	155	510
15	680	337	430	390	330	6500	1550	310	330	210	145	806
16	650	350	420	380	440	5710	1180	290	520	210	145	260
17	620	360	389	340	389	5150	1530	290	340	240	145	220
18	750	355	351	320	325	4720	1710	280	300	210	140	350
19	640	365	360	350	328	4070	1450	300	710	290	135	240
20	600	931	353	330	411	3460	1120	310	610	240	190	210
21	630	1050	360	340	402	3110	898	290	797	200	160	205
22	900	836	360	340	433	2830	744	400	372	190	135	210
23	1060	677	480	460	499	2560	669	370	360	190	130	250
24	823	566	420	400	470	2370	640	340	420	180	140	240
25	710	472	344	370	375	2210	640	310	410	200	480	220
26	650	469	338	330	339	2000	610	300	400	400	306	220
27	1130	703	367	320	369	1610	560	430	350	645	230	560
28	2680	584	376	360	408	1240	480	902	441	1720	205	490
29	1670	540	352	320	---	1100	430	705	879	822	180	300
30	1370	475	341	280	---	1140	430	550	420	285	205	280
31	1050	---	329	310	---	3530	---	540	---	310	185	---
TOTAL	48059	17632	14543	15730	10238	69917	41971	12417	13969	12391	6151	8036
MEAN	1550	588	469	507	366	2255	1399	401	466	400	198	268
MAX	7610	1050	1050	1350	499	6500	4920	902	879	1720	480	806
MIN	600	337	329	280	320	325	430	280	300	180	130	150
CFSM	2.11	.80	.64	.69	.50	3.07	1.91	.55	.64	.55	.27	.37
IN.	2.44	.89	.74	.80	.52	3.54	2.13	.63	.71	.63	.31	.41

CAL YR 1981 TOTAL 239769 MEAN 657 MAX 7610 MIN 130 CFSM .90 IN 12.15
WTR YR 1982 TOTAL 271054 MEAN 743 MAX 7610 MIN 130 CFSM 1.01 IN 13.74

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to September 1981.
WATER TEMPERATURES: October 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor August 1975 to September 1981.

REMARKS.--Bimonthly samples collected at bridge.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 3,580 micromhos Jan. 26, 1978; minimum recorded (water years 1975-76, 1978-81), 126 micromhos July 29, 1976.
WATER TEMPERATURES: Maximum, 29.5°C Sept. 20, 1978; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV												
19...	1230	340	836	8.1	7.0	11.0	92	820	320	290	67	77
JAN												
13...	1700	481	900	7.9	.0	11.6	82	410	E52	300	82	78
MAR												
18...	1745	--	448	7.9	1.5	--	--	K1400	K3100	160	42	45
MAY												
20...	1330	309	811	7.4	21.5	6.7	78	K620	170	250	64	68
JUN												
16...	1300	607	724	7.7	19.0	5.8	64	>6000	>2000	220	66	60
SEP												
16...	1300	261	673	7.4	19.0	6.3	69	5500	3100	200	61	54

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
NOV												
19...	23	48	26	3.7	220	57	84	.4	3.7	--	429	.58
JAN												
13...	25	62	31	3.6	220	62	100	.4	7.1	512	479	.70
MAR												
18...	12	27	26	3.9	120	32	48	.9	4.8	267	246	.36
MAY												
20...	20	60	34	4.3	188	56	110	.4	5.2	512	437	.70
JUN												
16...	17	53	34	4.0	154	49	90	.3	4.3	383	257	.52
SEP												
16...	15	45	32	5.0	136	52	79	.4	6.9	397	340	.54

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV												
19...	394	2.8	.110	.14	.86	.110	.34	.080	.040	6	5.5	100
JAN												
13...	665	3.2	.190	.24	.70	.110	.34	.060	.060	19	25	100
MAR												
18...	--	1.2	.200	.26	2.40	.140	.43	.070	.060	54	--	100
MAY												
20...	427	2.5	.160	.21	1.10	.190	.58	.130	.120	25	21	100
JUN												
16...	628	2.1	.180	.23	.70	.300	.92	.060	.050	133	218	100
SEP												
16...	280	3.0	.190	.24	1.60	.260	.80	.160	.130	33	23	100

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
JAN										
13...	1700	2	1	--	53	--	4	10	<10	<1
MAR										
18...	1745	1	1	100	31	2	<1	10	<10	1
JUN										
16...	1300	4	3	<100	55	--	<1	10	<10	1
SEP										
16...	1300	4	3	100	57	1	<1	10	<10	1

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
JAN										
13...	<1	13	4	590	15	5	1	60	49	.1
MAR										
18...	<1	44	3	1100	58	13	<1	70	45	.1
JUN										
16...	1	--	5	3900	31	--	2	190	24	.1
SEP										
16...	1	11	4	1400	20	11	2	90	48	.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
JAN									
13...	.1	19	10	<1	<1	<1	<1	110	18
MAR									
18...	.1	7	3	<1	<1	<1	<1	40	13
JUN									
16...	.1	--	8	<1	<1	<1	<1	70	5
SEP									
16...	<.1	21	20	<1	<1	<1	<1	60	4

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	PCB, TOTAL (UG/L)	PCB, TOTAL IN BOTTOM MATERIAL (UG/KG)	ALDRIN, TOTAL (UG/L)	ALDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	CHLORDANE, TOTAL (UG/L)	CHLORDANE, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDD, TOTAL (UG/L)	DDD, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDE, TOTAL (UG/L)	DDE, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDT, TOTAL (UG/L)
NOV												
19...	1230	--	6	--	<.1	--	2.0	--	2.0	--	<.1	--
MAR												
23...	1245	<.10	--	<.01	--	<.10	--	<.01	--	<.01	--	<.01
MAY												
20...	1330	<.10	93	<.01	<.1	<.10	18	<.01	<.1	<.01	5.1	<.01

DATE	DDT, TOTAL IN BOTTOM MATERIAL (UG/KG)	DIAZINON, TOTAL (UG/L)	DIELDRIN TOTAL (UG/L)	DIELDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ENDOSULFAN, TOTAL (UG/L)	ENDOSULFAN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ENDRIN, TOTAL (UG/L)	ENDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ETHION, TOTAL (UG/L)	HEPTACHLOR, TOTAL (UG/L)	HEPTACHLOR, TOTAL IN BOTTOM MATERIAL (UG/KG)	HEPTACHLOR EPOXIDE TOTAL (UG/L)
NOV												
19...	.3	--	--	<.1	--	<.1	--	<.1	--	--	<.1	--
MAR												
23...	--	<.01	<.01	--	<.01	--	<.01	--	<.01	<.01	--	<.01
MAY												
20...	<.1	.02	<.01	<.1	<.01	<.1	<.01	<.1	<.01	<.01	<.1	<.01

DATE	HEPTACHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG)	LINDANE TOTAL (UG/L)	LINDANE TOTAL IN BOTTOM MATERIAL (UG/KG)	MALATHION, TOTAL (UG/L)	METHOXYCHLOR, TOTAL (UG/L)	METHOXYCHLOR, TOT. IN BOTTOM MATL. (UG/KG)	METHYL PARATHION, TOTAL (UG/L)	METHYL TRITHION, TOTAL (UG/L)	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L)	PCN, TOTAL IN BOTTOM MATERIAL (UG/KG)	MIREX, TOTAL (UG/L)
NOV											
19...	<.1	--	<.1	--	--	<.1	--	--	--	<1.0	<.10
MAR											
23...	--	<.01	--	<.01	<.01	--	<.01	<.01	<.10	--	<.01
MAY											
20...	<.1	<.01	<.1	.01	<.01	<.1	<.01	<.01	<.10	<1.0	<.01

DATE	MIREX, TOTAL IN BOTTOM MATERIAL (UG/KG)	PARATHION, TOTAL (UG/L)	PERTHANE IN BOTTOM MATERIL (UG/KG)	PERTHANE TOTAL (UG/L)	TOXAPHENE, TOTAL (UG/L)	TOXAPHENE, TOTAL IN BOTTOM MATERIAL (UG/KG)	TOTAL TRITHION (UG/L)	2,4-D, TOTAL (UG/L)	2,4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
NOV											
19...	<.1	--	<.10	--	--	<1.0	--	--	--	--	--
MAR											
23...	--	<.01	--	<.01	<0	--	<.01	.02	<.01	<.01	<.01
MAY											
20...	<.1	<.01	<1.00	<.10	<1	80	<.01	1.4	<.01	<.01	.04

04165556 CLINTON RIVER BY-PASS BELOW WEIR AT MOUNT CLEMENS, MI

LOCATION.--Lat 42°34'43", long 82°52'34", in NW¼ sec.23, T.2 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on right bank 600 ft (183 m) downstream from weir, on Wellington Crescent in Mount Clemens.

PERIOD OF RECORD.--December 1979 to current year (gage heights only).

GAGE.--Water-stage recorder. Datum of gage is 570.43 ft (173.867 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records poor.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 8.69 ft (2.649 m) Oct. 1, 1981; minimum, 4.59 ft (1.399 m) Jan. 5, 1982.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 8.69 ft (2.649 m) Oct. 1; minimum, 4.59 ft (1.399 m) Jan. 5.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.86	5.72	5.63	5.14	5.44	5.04	6.68	5.59	---	5.66	5.54	5.33
2	7.90	5.67	5.30	5.35	5.30	4.99	6.24	5.58	---	5.66	5.54	5.26
3	6.99	5.66	5.25	5.35	5.26	5.00	5.90	5.57	---	5.71	5.57	5.14
4	6.42	5.62	5.26	5.43	5.28	5.04	5.10	5.58	---	5.81	5.53	5.26
5	6.16	5.59	5.20	5.23	5.21	5.12	5.75	5.58	---	5.80	5.52	5.28
6	5.88	5.25	5.30	5.34	5.17	5.15	5.65	5.56	---	5.77	5.55	5.23
7	5.67	5.42	5.26	5.32	5.06	5.18	5.82	5.54	---	5.67	5.57	5.30
8	5.84	5.51	4.94	5.42	5.01	5.24	5.83	5.51	---	5.67	5.58	5.29
9	5.89	5.43	4.93	5.50	5.01	5.25	5.78	5.51	---	5.67	5.48	5.27
10	5.88	5.54	4.99	5.48	5.01	5.23	5.75	5.53	---	5.70	5.47	5.25
11	5.80	5.42	5.11	5.46	4.99	5.20	5.70	5.53	---	5.67	5.48	5.24
12	5.84	5.50	5.25	5.49	4.99	5.18	5.81	5.51	---	5.56	5.52	5.23
13	5.83	5.45	5.23	5.51	5.02	6.13	5.72	5.51	---	5.63	5.52	5.23
14	5.76	5.42	5.22	5.54	5.03	7.06	5.82	5.54	---	5.65	5.49	5.24
15	5.63	5.39	5.13	5.54	5.02	7.42	5.81	5.54	---	5.63	5.47	5.25
16	5.59	5.37	5.10	5.53	5.04	7.12	5.78	5.53	5.62	5.65	5.45	5.13
17	5.73	5.32	5.14	5.53	5.13	6.87	5.72	5.53	5.64	5.60	5.40	5.22
18	5.40	5.26	5.07	5.55	5.20	6.70	5.78	5.55	5.64	5.59	5.43	5.11
19	5.28	5.40	4.98	5.53	5.19	6.48	5.88	5.52	5.63	5.60	5.37	5.22
20	5.43	5.29	5.13	5.49	5.15	6.29	5.70	5.51	5.68	5.60	5.33	5.08
21	5.49	5.20	5.25	5.52	5.12	6.14	5.55	5.52	5.64	5.63	5.32	5.07
22	5.61	5.32	5.25	5.54	5.10	5.99	5.67	5.61	5.65	5.62	5.37	5.08
23	5.61	5.42	5.30	5.59	5.06	5.93	5.61	5.61	5.64	5.59	5.33	5.09
24	5.67	5.42	5.36	5.41	5.11	5.85	5.66	5.57	5.66	5.63	5.36	5.17
25	5.71	5.44	5.36	5.44	5.14	5.79	5.69	5.55	5.64	5.56	5.27	5.12
26	5.68	5.52	5.39	5.50	5.13	5.70	5.65	5.54	5.63	5.57	5.35	5.12
27	5.74	5.08	5.37	5.48	5.13	5.65	5.53	5.59	5.66	5.63	5.31	5.16
28	6.14	5.13	5.29	5.38	5.11	5.65	5.60	5.68	5.69	5.74	5.31	5.24
29	6.05	5.25	5.31	5.28	---	5.60	5.62	---	5.72	5.71	5.40	5.29
30	5.93	5.38	5.30	5.27	---	5.60	5.61	---	5.63	5.68	5.38	5.24
31	5.83	---	5.32	5.35	---	6.11	---	---	---	5.57	5.33	---
MEAN	5.94	5.41	5.22	5.44	5.12	5.80	5.75	---	---	5.65	5.44	5.20
MAX	7.90	5.72	5.63	5.59	5.44	7.42	6.68	---	---	5.81	5.58	5.33
MIN	5.28	5.08	4.93	5.14	4.99	4.99	5.10	---	---	5.56	5.27	5.07

04165557 CLINTON RIVER BY-PASS AT MOUTH AT MOUNT CLEMENS, MI

LOCATION.--Lat 42°33'41", long 82°50'43", in SW¼ sec.30, T.2 N., R.14 E., Macomb County, Hydrologic Unit 04090003, on left bank at mouth, in Mount Clemens.

PERIOD OF RECORD.--October 1979 to current year (gage heights only).

GAGE.--Water-stage recorder. Altitude of gage is 580 ft (177 m), from topographic map.

REMARKS.--Records fair.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height, 2.94 ft (0.896 m) Aug. 6, 1980; minimum daily, 0.73 ft (0.223 m) Jan. 21, 22, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum daily gage height, 2.80 ft (0.853 m) Oct. 4; minimum daily, 1.47 ft (0.448 m) Dec. 9, Feb. 9.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.75	2.21	2.28	1.62	1.91	1.67	2.11	2.21				---
2	2.44	2.17	2.01	1.82	1.78	1.60	2.63	---				---
3	2.67	2.19	1.91	1.81	1.73	1.62	2.54	---				---
4	2.80	2.18	1.93	1.89	1.74	1.67	1.90	---				---
5	2.65	2.18	1.91	1.75	1.68	1.74	2.51	---				---
6	2.39	1.77	1.82	1.79	1.64	1.78	2.36	---				---
7	2.17	1.97	1.78	1.78	1.53	1.81	2.46	---				---
8	2.38	2.06	1.48	1.85	1.48	1.87	2.44	---				---
9	2.40	1.94	1.47	1.95	1.47	1.91	2.37	---				---
10	2.44	2.08	1.53	2.05	1.48	1.87	2.30	---				---
11	2.32	1.95	1.65	1.92	1.49	1.80	2.24	---				---
12	2.45	2.07	1.75	1.96	1.49	1.75	2.39	---				---
13	2.46	2.04	1.73	2.00	1.51	1.76	2.47	---				---
14	2.42	2.04	1.71	2.02	1.54	1.90	2.57	---				---
15	2.20	1.99	1.81	2.03	1.52	2.14	2.50	---				---
16	2.14	1.90	1.88	2.03	1.53	2.27	2.51	---				1.87
17	2.32	1.83	1.91	2.07	1.65	2.30	2.57	---				1.90
18	2.04	1.77	1.77	2.06	1.71	2.32	2.58	---				1.90
19	1.81	2.03	1.50	2.02	1.72	2.34	2.71	---				1.90
20	1.98	2.00	1.63	1.98	1.69	2.36	2.57	---				1.85
21	2.04	1.83	1.74	1.99	1.67	2.34	2.27	---				1.76
22	2.09	1.81	1.72	2.03	1.66	2.28	2.31	---				1.74
23	2.13	1.93	1.77	2.04	1.63	2.26	2.25	---				1.73
24	2.22	2.15	1.83	1.86	1.68	2.22	2.29	---				1.90
25	2.28	2.12	1.83	1.90	1.72	2.20	2.30	---				1.72
26	2.20	2.21	1.86	1.96	1.73	2.16	2.24	---				1.69
27	2.18	1.81	1.84	1.97	1.72	2.18	2.15	---				1.77
28	2.35	1.66	1.77	1.84	1.72	2.21	2.22	---				1.82
29	2.55	1.76	1.78	1.75	---	2.17	2.22	---				1.97
30	2.45	1.92	1.78	1.74	---	2.15	2.22	---				1.94
31	2.40	---	1.78	1.81	---	2.08	---	---				---
MEAN	2.33	1.99	1.78	1.91	1.64	2.02	2.37	---				---
MAX	2.80	2.21	2.28	2.07	1.91	2.36	2.71	---				---
MIN	1.81	1.66	1.47	1.62	1.47	1.60	1.90	---				---

04165700 DETROIT RIVER AT DETROIT, MI
(National stream-quality accounting network station)

LOCATION.--Lat 42°20'50", long 82°57'31", in T.2 S., R.13 E., Wayne County, Hydrologic Unit 04090004, at Detroit municipal water treatment facility at Water Works Park in Detroit.

DRAINAGE AREA.--228,800 mi² (592,600 km²), approximately.

PERIOD OF RECORD.--Water years 1970 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1974 to September 1981.
WATER TEMPERATURES: October 1973 to September 1981.

REMARKS.--Bimonthly samples collected as surface samples near the municipal water intake. The intake is in a lagoon at north end of Belle Isle in the Detroit River. Daily-mean water-discharges are reported for sampling times. January discharge affected by ice.

COOPERATION.--Water-discharges were furnished by the National Oceanic and Atmospheric Administration.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 383 micromhos Apr. 8, 1979; minimum daily, 194 micromhos July 24, 1976.
WATER TEMPERATURES: Maximum daily, 24.5°C July 21, 1977, Aug. 29-31, 1980; minimum daily, 0.0°C Jan. 8, 1980.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--A specific conductance value of 174 micromhos, and a water temperature of 0.0°C, were observed on Jan. 12, 1982.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)
NOV											
18...	1000	206000	198	8.2	8.0	11.8	101	<1	30	93	17
JAN											
12...	1100	240000	174	7.3	.0	14.1	97	<1	E7	100	23
MAR											
18...	1000	212000	265	--	.5	14.9	105	K120	E80	100	18
MAY											
19...	1245	192000	208	8.1	16.0	11.5	119	K1	K5	94	10
JUN											
15...	1100	192000	222	7.9	17.5	10.0	108	K3	32	100	19
SEP											
15...	1100	207000	208	7.8	21.0	8.4	95	K6	60	95	14

DATE	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)
NOV											
18...	26	6.9	3.7	8	.7	76	17	6.5	.2	1.1	120
JAN											
12...	28	8.0	4.8	9	.8	80	16	7.1	<.1	1.7	120
MAR											
18...	28	7.5	12	20	1.0	83	18	18	.1	1.3	147
MAY											
19...	26	7.1	4.2	9	.8	84	17	7.2	.1	1.1	111
JUN											
15...	29	7.4	4.2	8	.7	84	17	7.0	.2	.8	129
SEP											
15...	27	6.8	3.7	8	.8	81	15	6.2	.1	1.4	126

DATE	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)
NOV											
18...	109	.16	66700	<.01	.030	.04	.17	<.010	--	.020	<.010
JAN											
12...	114	.16	77800	.33	.020	.03	.32	.050	.15	.010	<.010
MAR											
18...	136	.20	84100	.53	.050	.06	1.20	.010	.03	<.010	<.010
MAY											
19...	114	.15	57500	.28	.020	.03	.28	.120	.37	<.010	.010
JUN											
15...	117	.18	66900	.22	<.010	.01	.20	.030	.09	.020	<.010
SEP											
15...	110	.17	70400	.22	<.010	.01	.50	.010	.03	<.010	<.010

04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
JAN										
12...	1100	1	0	--	18	16	2	10	<10	<1
MAR										
18...	1000	1	1	<100	19	1	<1	10	<10	<1
JUN										
15...	1100	1	<1	<100	19	1	<1	10	<10	2
SEP										
15...	1100	1	1	<100	18	<1	<1	10	<10	2

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
JAN										
12...	<1	10	2	190	6	<1	<1	10	1	<.1
MAR										
18...	<1	8	1	160	12	<7	2	<10	6	.1
JUN										
15...	<1	7	2	240	7	2	2	10	<1	<.1
SEP										
15...	<1	3	1	220	<3	3	2	20	1	<.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
JAN									
12...	<.1	6	1	<1	<1	<1	<1	50	6
MAR									
18...	.1	4	1	<1	<1	<1	<1	20	18
JUN									
15...	<.1	2	<1	<1	<1	<1	<1	10	<4
SEP									
15...	<.1	3	3	<1	<1	<1	<1	100	<4

04166000 RIVER ROUGE AT BIRMINGHAM, MI

LOCATION.--Lat 42°32'45", long 83°13'25", in NW¼ sec.36, T.2 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on left bank 25 ft (8 m) downstream from mouth of Quarton Lake outlet, and 100 ft (30 m) upstream from bridge on Maple Road, in Birmingham.

DRAINAGE AREA.--33.3 mi² (86.2 km²). Prior to water year 1971, drainage area was 36.9 mi² (95.6 km²). An area of 3.6 mi² (9.3 km²) noncontributing since then.

PERIOD OF RECORD.--June 1950 to current year.

REVISED RECORDS.--WSP 1387: 1951-52(M). WSP 1557: Drainage area.

GAGE.--Water-stage recorder. Concrete control since July 27, 1962. Datum of gage is 715.94 ft (218.219 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Occasional regulation by Quarton Lake above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years (water years 1951-70), 15.3 ft³/s (0.433 m³/s), 5.63 in/yr (143 mm/yr); 12 years (water years 1971-82), 22.2 ft³/s (0.629 m³/s), 9.05 in/yr (230 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,390 ft³/s (39.4 m³/s) June 26, 1968, gage height, 8.70 ft (2.652 m); minimum, 0.10 ft³/s (0.003 m³/s) Aug. 8, 9, 1963; minimum gage height, 1.02 ft (0.311 m) Oct. 12, 1961.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 180 ft³/s (5.10 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	0600	*1,050	29.7	*7.26	2.213	Mar. 31	0100	607	17.2	5.30	1.615
Mar. 13	2000	394	11.2	4.35	1.326	July 28	0700	444	12.6	4.62	1.408
Mar. 14	2200	216	6.12	3.38	1.030						

Minimum discharge, 4.0 ft³/s (0.11 m³/s) Sept. 10, 12, 13, 14, gage height, 1.60 ft (0.488 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	650	25	24	20	11	14	108	27	29	13	14	7.1
2	131	24	28	17	11	15	70	26	22	12	13	6.1
3	61	23	22	17	11	14	96	25	17	34	11	5.2
4	40	21	20	62	11	13	63	25	15	24	10	4.9
5	32	21	19	40	11	14	49	24	15	16	9.4	4.6
6	27	23	17	29	11	13	49	23	15	14	9.2	4.8
7	23	20	17	24	11	12	50	34	13	13	8.7	5.0
8	19	18	18	20	11	11	49	35	13	11	22	4.9
9	19	17	16	18	11	12	55	26	12	9.3	17	4.6
10	19	16	14	14	11	12	60	25	14	13	11	4.7
11	17	14	13	13	11	45	61	26	12	22	8.5	4.5
12	17	12	13	12	11	63	58	24	10	15	7.7	4.4
13	16	11	13	11	11	276	59	23	11	11	7.1	4.1
14	16	12	13	11	11	210	47	22	9.8	9.0	6.8	5.8
15	16	15	14	11	12	146	43	20	12	8.3	6.6	9.7
16	15	17	13	11	14	128	63	19	21	7.7	6.5	8.2
17	15	16	13	10	13	154	118	17	14	7.8	6.1	6.3
18	21	16	12	10	12	130	63	16	11	7.0	5.7	12
19	18	16	11	10	13	117	49	17	48	9.4	5.4	8.1
20	14	40	11	10	13	99	52	18	32	9.7	7.4	6.1
21	21	31	12	10	14	104	44	15	37	7.7	6.1	5.7
22	40	22	15	11	14	88	39	19	20	6.6	5.5	6.5
23	35	20	18	15	15	84	36	19	15	5.9	5.9	7.9
24	24	20	15	14	15	79	35	15	13	5.2	5.5	8.2
25	20	18	14	12	12	69	34	14	12	5.1	17	9.1
26	19	19	14	11	12	57	32	13	14	23	11	10
27	53	23	16	11	13	47	30	18	12	47	5.9	30
28	74	19	16	11	14	44	29	70	19	220	5.6	18
29	42	17	16	11	---	43	28	41	28	37	5.8	9.5
30	30	17	14	11	---	88	27	24	16	22	7.2	7.7
31	27	---	15	11	---	357	---	18	---	19	6.5	---
TOTAL	1571	583	486	498	340	2558	1596	738	531.8	664.7	275.1	233.7
MEAN	50.7	19.4	15.7	16.1	12.1	82.5	53.2	23.8	17.7	21.4	8.87	7.79
MAX	650	40	28	62	15	357	118	70	48	220	22	30
MIN	14	11	11	10	11	11	27	13	9.8	5.1	5.4	4.1
CFSM	1.52	.58	.47	.48	.36	2.48	1.60	.72	.53	.64	.27	.23
IN.	1.75	.65	.54	.56	.38	2.86	1.78	.82	.59	.74	.31	.26

CAL YR 1981 TOTAL 7936.6 MEAN 21.7 MAX 650 MIN 3.2 CFSM .65 IN 8.87
WTR YR 1982 TOTAL 10075.3 MEAN 27.6 MAX 650 MIN 4.1 CFSM .83 IN 11.25

04166100 RIVER ROUGE AT SOUTHFIELD, MI

LOCATION.--Lat 42°26'52", long 83°17'52", in SW¼ sec.32, T.1 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on right bank at downstream side of bridge on Beech Road at Southfield, 4.2 mi (6.8 km) east of Farmington.

DRAINAGE AREA.--87.9 mi² (227.7 km²).

PERIOD OF RECORD.--April 1958 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 609.62 ft (185.812 m) city of Southfield datum. Prior to Sept. 30, 1958, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--24 years, 59.7 ft³/s (1.691 m³/s), 9.22 in/yr (234 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,900 ft³/s (139 m³/s) June 26, 1968, gage height, 19.04 ft (5.803 m); minimum, 0.1 ft³/s (0.003 m³/s) Aug. 2, 1964, gage height, 1.15 ft (0.351 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 500 ft³/s (14.2 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	1000	*4,400	125	*18.20	5.547	Apr. 3	1400	528	15.0	8.10	2.469
Oct. 28	0500	614	17.4	8.73	2.661	Apr. 17	0800	664	18.8	8.82	2.688
Mar. 13	2300	1,620	45.9	12.33	3.758	May 28	2300	1,010	28.6	10.31	3.142
Mar. 17	0600	860	24.4	9.79	2.984	July 28	2100	557	15.8	8.26	2.518
Mar. 31	0800	1,450	41.1	11.76	3.584						

Minimum discharge, 11 ft³/s (0.31 m³/s) Sept. 11, 12, 13, 14; minimum gage height, 2.74 ft (0.835 m) Sept. 12, 13, 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2720	67	82	66	33	44	456	57	103	52	34	16
2	969	63	97	57	33	44	190	56	85	42	30	19
3	248	60	64	59	33	41	335	52	58	78	26	15
4	144	56	57	283	33	37	208	51	51	94	25	13
5	114	58	53	232	33	41	126	49	47	57	23	12
6	110	63	49	119	33	39	115	50	46	46	22	13
7	91	56	48	95	33	35	124	76	41	40	21	16
8	76	49	49	54	33	34	127	89	38	35	39	14
9	67	47	46	50	35	35	148	60	35	31	42	12
10	63	43	43	46	34	39	164	54	36	30	25	12
11	59	42	41	43	33	90	159	53	34	62	20	12
12	55	39	39	41	33	383	141	50	30	55	19	11
13	52	38	38	39	34	904	141	54	28	33	17	11
14	49	37	39	38	34	1310	113	47	27	28	16	12
15	48	38	39	37	35	892	97	44	30	26	16	18
16	47	40	40	36	41	596	146	41	50	24	15	17
17	44	41	39	35	41	810	505	38	38	30	15	15
18	63	40	42	35	38	650	185	36	30	25	14	34
19	54	40	37	34	38	541	127	48	111	29	14	20
20	43	118	38	34	40	391	122	39	91	34	18	16
21	54	108	32	34	41	437	105	36	163	23	17	14
22	124	64	43	34	43	335	89	45	63	20	14	14
23	120	55	49	40	45	271	82	48	45	19	15	20
24	71	52	50	40	44	233	75	38	38	18	15	19
25	58	49	42	39	37	191	72	36	35	17	30	22
26	53	48	47	38	36	155	69	34	32	21	26	28
27	151	76	46	36	39	109	65	39	32	76	17	64
28	381	56	50	35	41	96	62	364	51	343	15	55
29	172	48	47	34	---	94	59	378	221	130	15	27
30	89	45	41	34	---	108	57	96	75	50	21	21
31	73	---	47	33	---	1050	---	70	---	40	17	---
TOTAL	6412	1636	1454	1830	1026	10125	4464	2228	1764	1608	653	592
MEAN	207	54.5	46.9	59.0	36.6	327	149	71.9	58.8	51.9	21.1	19.7
MAX	2720	118	97	283	45	1310	505	378	221	343	42	64
MIN	43	37	32	33	33	34	57	34	27	17	14	11
CFSM	2.36	.62	.53	.67	.42	3.72	1.70	.82	.67	.59	.24	.22
IN.	2.71	.69	.62	.77	.43	4.28	1.89	.94	.75	.68	.28	.25

CAL YR 1981 TOTAL 26087.3 MEAN 71.5 MAX 2720 MIN 9.5 CFSM .81 IN 11.04
WTR YR 1982 TOTAL 33792.0 MEAN 92.6 MAX 2720 MIN 11 CFSM 1.05 IN 14.30

04166200 EVANS DITCH AT SOUTHFIELD, MI

LOCATION.--Lat 42°27'28", long 83°16'03", in SE¼ sec.28, T.1 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on right bank 20 ft (6 m) upstream from bridge on Nine-Mile Road, at Southfield, 1.6 mi (2.6 km) upstream from mouth, and 5.5 mi (8.8 km) east of Farmington.

DRAINAGE AREA.--9.49 mi² (24.58 km²).

PERIOD OF RECORD.--September 1958 to current year.

GAGE.--Water-stage recorder. Datum of gage is 615.07 ft (187.473 m) city of Southfield datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--24 years, 8.20 ft³/s (0.232 m³/s), 11.73 in/yr (298 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,200 ft³/s (34.0 m³/s) Oct. 1, 1981, gage height, 15.03 ft (4.581 m), from floodmarks, from rating curve extended above 410 ft³/s (11.6 m³/s); no flow part of each day Aug. 30, 31, 1978.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 270 ft³/s (7.65 m³/s), and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	0330	*1,200	34.0	*15.03	4.581	Apr. 3	0930	302	8.55	8.55	2.606
Mar. 13	0700	419	11.9	9.40	2.865	May 28	1530	349	9.88	8.90	2.713
Mar. 13	1800	387	11.0	9.17	2.795	June 28	2330	405	11.5	9.30	2.835
Mar. 31	0130	335	9.49	8.80	2.682	July 28	0730	489	13.8	9.90	3.018

Minimum discharge, 0.71 ft³/s (0.020 m³/s) Sept. 5, 6, 10, 16, 21, 22: minimum gage height, 5.75 ft (1.753 m) Sept. 5, 6, 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	442	4.5	12	11	2.4	3.4	13	4.1	18	3.5	2.1	1.2
2	14	3.8	8.4	3.5	2.5	3.5	9.3	3.8	4.1	3.0	2.5	1.1
3	7.1	3.5	4.5	4.5	2.5	3.3	61	3.5	3.3	42	1.9	.95
4	6.1	3.5	4.1	55	2.5	3.2	13	3.5	2.8	8.0	2.1	.95
5	5.5	6.8	3.5	14	2.5	3.2	9.7	3.3	2.8	4.1	1.9	1.6
6	13	7.1	3.0	8.4	2.5	3.1	8.4	3.3	2.8	3.5	1.7	1.6
7	5.1	4.1	3.3	6.4	2.5	3.0	11	14	2.1	3.3	1.9	1.9
8	4.5	3.5	3.3	4.5	2.5	2.9	14	5.1	2.1	2.5	18	.83
9	3.8	3.0	2.8	3.5	2.5	2.8	17	3.3	2.1	2.5	2.5	.83
10	3.5	3.3	2.3	3.0	2.5	3.1	15	2.8	3.8	12	1.6	.83
11	3.3	3.3	2.3	3.0	2.5	34	16	2.5	1.9	6.8	1.6	.95
12	3.3	3.3	2.3	3.0	2.5	38	12	2.8	1.9	3.5	1.4	.95
13	3.3	2.8	2.5	3.0	2.6	278	12	4.5	1.7	2.5	1.4	1.1
14	3.5	2.8	2.5	3.0	2.7	87	8.4	2.1	2.1	2.1	1.6	2.8
15	3.8	3.0	2.5	3.0	2.8	44	7.1	2.1	8.0	1.9	1.4	2.3
16	3.8	3.3	2.5	2.8	3.0	80	18	1.9	7.1	1.9	1.4	.83
17	3.8	3.0	2.3	2.8	3.2	59	27	1.9	2.8	5.1	1.6	.95
18	11	2.5	2.1	2.7	3.1	40	9.7	2.3	2.1	2.1	1.6	8.4
19	3.5	3.5	1.7	2.5	3.0	32	8.0	4.8	36	6.4	1.6	1.1
20	2.8	32	1.7	2.3	3.1	30	10	2.3	25	2.8	4.5	1.7
21	12	8.0	1.7	2.3	3.2	27	6.8	1.9	29	1.9	1.4	.95
22	23	4.8	3.5	2.3	3.4	20	6.1	8.4	3.8	1.6	1.2	2.3
23	11	3.8	5.1	3.0	3.5	18	5.1	3.0	2.8	1.7	1.2	3.5
24	5.1	3.5	3.3	3.0	3.5	15	4.8	2.1	2.1	1.6	1.2	3.3
25	4.1	3.0	2.1	2.5	3.2	15	4.8	2.1	2.1	1.7	9.7	6.1
26	3.8	5.5	1.9	2.3	3.1	13	5.1	2.3	1.9	12	1.4	3.5
27	75	9.7	2.5	2.1	3.1	8.9	4.5	11	1.7	7.5	1.2	33
28	24	4.1	3.3	2.2	3.2	8.0	4.5	80	107	92	1.2	3.3
29	7.1	3.5	2.5	2.2	---	8.4	4.5	7.1	48	3.8	1.7	1.9
30	6.1	3.0	2.1	2.3	---	29	4.1	4.1	5.1	2.5	3.5	1.7
31	5.1	---	2.3	2.4	---	68	---	3.3	---	2.3	1.2	---
TOTAL	723.0	151.5	99.9	168.5	79.6	983.8	349.9	199.2	336.0	248.1	79.2	92.42
MEAN	23.3	5.05	3.22	5.44	2.84	31.7	11.7	6.43	11.2	8.00	2.55	3.08
MAX	442	32	12	55	3.5	278	61	80	107	92	18	33
MIN	2.8	2.5	1.7	2.1	2.4	2.8	4.1	1.9	1.7	1.6	1.2	.83
CFSM	2.46	.53	.34	.57	.30	3.34	1.23	.68	1.18	.84	.27	.33
IN.	2.83	.59	.39	.66	.31	3.86	1.37	.78	1.32	.97	.31	.36

CAL YR 1981 TOTAL 3876.20 MEAN 8.43 MAX 442 MIN 1.3 CFSM .89 IN 12.06
WTR YR 1982 TOTAL 3511.12 MEAN 9.62 MAX 442 MIN .83 CFSM 1.01 IN 13.76

04166300 UPPER RIVER ROUGE AT FARMINGTON, MI

LOCATION.--Lat 42°27'52", long 83°22'11", in NW¼ sec.27, T.1 N., R.9 E., Oakland County, Hydrologic Unit 04090004, on left bank 800 ft (244 m) downstream from bridge on Shiawassee Road at Farmington.

DRAINAGE AREA.--17.5 mi² (45.3 km²).

PERIOD OF RECORD.--March 1958 to current year.

REVISED RECORDS.--WSP 1912: 1959(M), 1960(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 690.4 ft (210.43 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--24 years, 11.8 ft³/s (0.334 m³/s), 9.16 in/yr (233 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,500 ft³/s (42.5 m³/s) June 25, 1968, gage height, 8.70 ft (2.652 m); minimum, 0.07 ft³/s (0.002 m³/s) Aug. 30, 1966, result of regulation; minimum daily, 0.32 ft³/s (0.009 m³/s) Aug. 10, 1964, Aug. 29, 1966.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 120 ft³/s (3.40 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	0700	*878	24.9	*7.15	2.179	May 28	1600	254	7.19	4.84	1.475
Mar. 13	2100	328	9.29	5.20	1.585	June 29	0100	252	7.14	4.83	1.472
Mar. 30	2300	420	11.9	5.59	1.704						

Minimum discharge, 0.82 ft³/s (0.023 m³/s) Dec. 18, gage height, 2.76 ft (0.841 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	594	13	14	11	5.0	6.5	67	9.2	35	20	4.0	2.6
2	138	12	17	10	4.9	6.6	42	8.9	27	12	3.8	2.4
3	59	10	12	10	4.9	6.3	55	8.1	15	28	3.4	2.5
4	41	9.5	11	54	4.8	6.0	37	8.1	12	22	3.6	2.2
5	29	9.6	10	48	4.8	6.1	26	7.7	10	13	3.6	1.8
6	24	11	9.3	28	4.8	5.9	19	7.3	9.3	9.9	3.3	2.1
7	18	9.4	9.5	19	4.8	5.4	30	16	7.9	7.9	2.8	2.6
8	15	8.4	9.8	13	4.8	5.2	28	17	6.9	5.9	5.8	2.4
9	13	8.0	9.2	10	4.8	5.3	34	11	6.2	5.2	4.3	2.3
10	11	7.5	8.8	8.7	4.8	6.0	37	9.2	6.4	5.4	2.9	1.9
11	10	7.2	8.2	7.7	4.9	30	35	8.5	5.5	8.9	2.4	1.7
12	9.1	6.9	7.7	6.9	4.9	80	33	7.4	5.1	9.6	2.3	1.5
13	8.8	6.7	7.2	6.2	5.0	200	31	11	4.7	6.2	2.1	1.5
14	8.2	6.8	7.0	5.8	5.1	195	24	8.1	4.2	4.6	2.0	1.7
15	7.7	6.8	6.9	5.5	5.4	135	20	6.7	4.9	4.1	2.1	2.6
16	7.5	7.1	6.7	5.2	5.9	113	43	6.2	7.4	4.6	2.3	2.6
17	7.5	6.9	6.6	4.9	6.2	143	72	5.8	5.7	5.5	2.3	2.4
18	11	6.7	6.5	4.7	5.8	111	34	5.6	4.4	5.0	2.1	5.7
19	9.7	7.2	6.4	4.6	5.8	98	25	6.2	22	8.3	1.9	3.3
20	8.3	28	6.3	4.5	6.0	82	23	5.1	24	5.2	2.4	2.6
21	14	24	6.2	4.4	6.2	86	18	4.9	46	3.4	2.8	2.4
22	30	16	7.0	4.4	6.4	73	15	8.0	15	2.5	2.4	2.3
23	25	12	8.0	10	6.8	68	14	7.8	9.1	2.3	2.3	2.6
24	14	11	8.5	9.0	6.6	62	13	6.6	6.7	2.3	2.1	2.9
25	11	9.8	8.3	6.5	6.0	51	12	6.0	5.6	2.1	5.9	3.5
26	9.4	11	8.7	6.0	5.8	41	11	5.5	5.0	3.1	2.8	3.6
27	40	15	8.8	5.7	5.7	29	11	9.7	4.9	6.7	2.4	15
28	69	11	8.7	5.5	6.1	26	9.7	119	33	45	2.4	7.8
29	30	10	8.6	5.3	---	26	9.4	83	147	12	2.4	4.1
30	20	9.6	8.2	5.2	---	62	9.2	31	43	6.0	3.9	3.1
31	16	---	8.0	5.1	---	200	---	18	---	4.5	2.9	---
TOTAL	1308.2	318.1	269.1	334.8	153.0	1970.3	837.3	472.6	538.9	281.2	91.7	95.7
MEAN	42.2	10.6	8.68	10.8	5.46	63.6	27.9	15.2	18.0	9.07	2.96	3.19
MAX	594	28	17	54	6.8	200	72	119	147	45	5.9	15
MIN	7.5	6.7	6.2	4.4	4.8	5.2	9.2	4.9	4.2	2.1	1.9	1.5
CFSM	2.41	.61	.50	.62	.31	3.63	1.59	.87	1.03	.52	.17	.18
IN.	2.78	.68	.57	.71	.33	4.19	1.78	1.00	1.15	.60	.19	.20

CAL YR 1981 TOTAL 5748.5 MEAN 15.7 MAX 594 MIN 2.8 CFSM .90 IN 12.22
WTR YR 1982 TOTAL 6670.9 MEAN 18.3 MAX 594 MIN 1.5 CFSM 1.05 IN 14.18

04166500 RIVER ROUGE AT DETROIT, MI

LOCATION.--Lat 42°22'20", long 83°15'20", in SW¼ sec.27, T.1 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 500 ft (152 m) upstream from bridge on Plymouth Road in Detroit, and 4 mi (6 km) upstream from Middle River Rouge.

DRAINAGE AREA.--187 mi² (484 km²).

PERIOD OF RECORD.--October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1034: 1933(M). WSP 1054: 1939, 1943, 1945(M). WSP 1437: 1931-32, 1934, 1936(M), 1937-38, 1944(M), 1945. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 584.00 ft (178.003 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 16, 1948, nonrecording gage at site 1 mi (2 km) downstream at datum 4.6 ft (1.4 m) lower.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--52 years, 114 ft³/s (3.228 m³/s), 8.28 in/yr (210 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,000 ft³/s (368 m³/s) Apr. 5, 1947: maximum gage height, 23.0 ft (7.01 m) Apr. 6, 1947, from floodmark, site and datum then in use; minimum discharge, 1.8 ft³/s (0.051 m³/s) Aug. 1, 2, 1964, gage height, 3.00 ft (0.914 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft³/s (34.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	1800	*6,830	193	*21.08	6.425	Mar. 31	2100	1,450	41.1	13.06	3.981
Mar. 14	1000	2,520	71.4	15.63	4.764	May 29	0900	1,200	34.0	12.24	3.731

Minimum discharge, 15 ft³/s (0.42 m³/s) Sept. 10, 11, 12, 13, 14: minimum gage height, 3.83 ft (1.167 m) Sept. 10, 11, 12, 13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4910	127	115	113	59	71	903	87	190	114	49	26
2	3230	112	180	113	59	75	315	83	197	84	56	30
3	685	103	113	84	58	72	505	79	102	258	43	24
4	258	94	97	403	57	67	399	75	92	235	38	20
5	202	108	89	413	57	67	221	72	79	112	38	19
6	252	116	79	209	57	68	181	75	78	86	33	20
7	198	102	75	150	58	63	197	126	69	72	31	28
8	147	83	78	86	58	60	222	179	65	60	77	23
9	125	77	73	80	58	60	256	96	59	52	86	19
10	115	71	56	76	58	67	291	78	60	76	41	16
11	108	69	62	72	58	280	276	72	58	165	31	16
12	103	65	58	69	58	490	244	73	49	90	28	15
13	96	61	58	66	58	950	234	92	48	61	25	16
14	93	62	57	65	60	2180	197	69	43	48	23	75
15	89	60	58	63	63	1480	164	62	71	42	23	49
16	89	63	59	62	69	931	173	56	151	40	22	26
17	86	66	56	62	70	1140	665	54	69	64	22	24
18	146	63	54	61	64	947	347	50	52	50	20	76
19	119	63	63	60	65	756	213	84	243	70	20	46
20	92	259	55	60	67	564	198	56	226	77	29	27
21	105	261	50	60	71	599	178	50	425	45	36	23
22	281	126	58	59	73	491	144	70	142	34	24	22
23	294	96	78	74	76	427	129	88	84	31	23	43
24	153	87	80	71	77	383	119	59	68	29	23	36
25	115	80	71	69	65	337	115	52	60	27	73	53
26	105	91	60	66	62	305	109	50	56	34	51	66
27	315	186	64	64	64	212	102	86	52	100	31	207
28	836	103	68	63	68	182	94	562	231	366	24	152
29	280	83	63	61	---	177	90	909	773	285	22	54
30	179	75	83	60	---	200	86	216	221	81	36	37
31	143	---	59	60	---	1050	---	129	---	58	32	---
TOTAL	13949	3012	2269	3074	1767	14751	7367	3889	4113	2946	1110	1288
MEAN	450	100	73.2	99.2	63.1	476	246	125	137	95.0	35.8	42.9
MAX	4910	261	180	413	77	2180	903	909	773	366	86	207
MIN	86	60	50	59	57	60	86	50	43	27	20	15
CFSM	2.41	.54	.39	.53	.34	2.55	1.32	.67	.73	.51	.19	.23
IN.	2.77	.60	.45	.61	.35	2.93	1.47	.77	.82	.59	.22	.26

CAL YR 1981 TOTAL 52166 MEAN 143 MAX 4910 MIN 18 CFSM .77 IN 10.38
WTR YR 1982 TOTAL 59535 MEAN 163 MAX 4910 MIN 15 CFSM .87 IN 11.84

04168000 LOWER RIVER ROUGE AT INKSTER, MI

LOCATION.--Lat 42°18'00", long 83°18'00", in SW¼ SE¼ sec.19, T.2 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 10 ft (3 m) downstream from bridge on John Daly Road, 0.6 mi (1.0 km) northeast of Inkster, and 4.8 mi (7.7 km) upstream from mouth.

DRAINAGE AREA.--83.2 mi² (215.5 km²).

PERIOD OF RECORD.--June 1947 to current year.

REVISED RECORDS.--WSP 1174: 1948(M). WSP 1437: 1949. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 593.14 ft (180.789 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 20, 1948, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period and those for period of indefinite stage-discharge relation, Mar. 12-21, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 52.0 ft³/s (1.473 m³/s), 8.49 in/yr (216 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,600 ft³/s (102 m³/s) June 26, 1968, gage height, 13.62 ft (4.151 m); minimum, 0.2 ft³/s (0.006 m³/s) Sept. 13, 1955, Jan. 23, 1961.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 900 ft³/s (25.5 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 14	--	*1550	43.9	*12.71	3.874	Mar. 17	--	980	27.8	10.13	3.088

Minimum discharge, 1.5 ft³/s (0.042 m³/s) Sept. 13, gage height, 2.61 ft (0.796 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	613	64	67	35	13	17	190	18	43	21	9.3	2.3
2	529	54	99	32	13	18	102	16	34	15	8.8	2.6
3	137	50	75	30	13	17	251	15	21	77	8.5	2.7
4	77	38	59	229	14	16	172	15	16	73	7.1	2.6
5	55	45	55	244	14	15	84	15	15	31	8.8	2.1
6	43	46	46	169	14	15	54	15	12	21	9.6	3.8
7	35	43	40	110	13	15	70	35	10	16	8.8	5.8
8	29	35	40	90	13	14	84	30	9.5	13	14	3.2
9	26	29	35	60	13	14	123	20	8.9	12	9.1	2.8
10	22	25	24	45	13	15	157	16	8.1	31	7.0	2.3
11	17	25	26	35	13	25	143	14	7.6	30	6.2	3.4
12	16	22	21	25	13	250	132	17	8.8	13	4.7	4.3
13	14	21	19	20	13	820	120	56	7.4	8.9	4.4	1.7
14	13	21	19	16	14	1380	84	23	6.4	7.5	6.0	70
15	13	19	21	15	15	1150	61	18	32	8.6	4.0	30
16	16	19	19	14	16	880	60	11	43	6.3	3.2	13
17	13	19	19	13	16	920	140	9.2	16	7.1	2.8	5.5
18	29	18	21	12	15	730	112	9.7	12	7.9	2.8	43
19	15	19	17	11	15	480	66	17	46	29	5.0	11
20	14	131	14	11	15	340	58	8.6	47	37	4.5	6.2
21	22	217	15	12	16	355	49	9.0	103	17	3.8	4.1
22	75	103	17	13	17	292	36	20	37	8.6	2.6	4.7
23	129	68	26	17	18	256	30	17	17	8.0	2.5	5.4
24	78	55	21	15	18	228	26	11	12	10	2.1	6.6
25	45	47	17	13	17	201	23	8.7	11	4.9	3.5	15
26	35	45	16	12	16	195	22	7.9	12	37	3.1	13
27	217	139	19	11	15	104	21	48	7.8	134	5.0	107
28	569	95	19	11	16	80	22	160	111	91	4.6	41
29	298	59	18	12	---	73	18	232	145	59	2.8	13
30	127	46	19	12	---	92	17	71	47	24	2.7	7.0
31	86	---	18	12	---	322	---	41	---	16	2.1	---
TOTAL	3407	1617	941	1356	411	9329	2527	1004.1	906.5	874.8	169.4	435.1
MEAN	110	53.9	30.4	43.7	14.7	301	84.2	32.4	30.2	28.2	5.46	14.5
MAX	613	217	99	244	18	1380	251	232	145	134	14	107
MIN	13	18	14	11	13	14	17	7.9	6.4	4.9	2.1	1.7
CFSM	1.32	.65	.37	.53	.18	3.62	1.01	.39	.36	.34	.07	.17
IN.	1.52	.72	.42	.61	.18	4.17	1.13	.45	.41	.39	.08	.19

CAL YR 1981 TOTAL 22055.7 MEAN 60.4 MAX 999 MIN 1.7 CFSM .73 IN 9.86
WTR YR 1982 TOTAL 22977.9 MEAN 63.0 MAX 1380 MIN 1.7 CFSM .76 IN 10.27

04170000 HURON RIVER AT MILFORD, MI

LOCATION.--Lat 42°34'44", long 83°37'36", in NE¼ sec.16, T.2 N., R.7 E., Oakland County, Hydrologic Unit 04090005, on left bank 40 ft (12 m) downstream from bridge on General Motors Road, 0.5 mi (0.8 km) downstream from Sherwood Creek, and 0.5 mi (0.8 km) west of Milford.

DRAINAGE AREA.--132 mi² (342 km²).

PERIOD OF RECORD.--September 1948 to current year.

REVISED RECORDS.--WSP 1337: 1952(m). WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 880.00 ft (268.224 m) National Geodetic Vertical Datum of 1929. Prior to Apr. 1, 1970, at site 240 ft (73 m) upstream at same datum.

REMARKS.--Records good. Flow below about 300 ft³/s (8.50 m³/s) regulated by powerplant 1.5 mi (2.4 km) above station prior to May 20, 1957; occasional regulation for lake level control since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--34 years, 97.7 ft³/s (2.767 m³/s), 10.05 in/yr (255 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 648 ft³/s (18.4 m³/s) Oct. 3, 1981, gage height, 7.87 ft (2.399 m); maximum gage height, 8.26 ft (2.518 m) June 28, 1968; minimum daily discharge, 5.2 ft³/s (0.15 m³/s) Oct. 21, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 648 ft³/s (18.4 m³/s) Oct. 3, gage height, 7.87 ft (2.399 m); minimum, 16 ft³/s (0.45 m³/s) July 16, 17, gage height, 4.05 ft (1.234 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	418	219	127	148	99	101	390	117	143	124	72	54
2	596	210	129	146	98	103	375	111	161	118	78	53
3	632	198	127	145	100	102	331	107	151	120	80	52
4	544	188	125	160	104	100	306	102	142	130	72	53
5	468	184	124	170	105	113	307	97	135	122	60	52
6	411	184	122	169	105	110	274	87	130	113	63	53
7	366	182	122	162	105	105	269	94	133	100	61	53
8	330	171	123	154	105	105	264	108	130	99	55	50
9	303	159	122	150	105	105	252	100	120	96	49	47
10	281	151	117	140	105	105	246	94	113	93	50	44
11	259	145	113	140	104	116	246	86	104	86	45	40
12	237	142	113	140	102	132	243	83	96	89	38	38
13	220	138	114	140	101	197	233	90	80	86	37	38
14	205	136	117	140	101	255	233	85	68	94	39	42
15	197	134	120	135	102	281	229	83	70	84	37	45
16	189	125	125	130	105	292	191	79	74	46	37	44
17	181	122	129	130	104	310	174	76	72	33	39	48
18	177	122	130	125	102	324	207	73	70	54	35	60
19	194	124	132	120	102	330	239	70	98	59	37	57
20	193	149	134	115	103	327	250	68	113	57	34	52
21	187	163	135	109	103	319	203	66	122	54	36	50
22	204	152	140	104	105	318	171	76	107	48	42	51
23	218	143	147	103	106	319	151	80	96	45	41	58
24	209	137	149	100	106	320	78	73	90	45	41	68
25	197	132	147	95	104	319	136	76	82	38	57	75
26	191	132	147	91	96	305	132	73	77	39	52	78
27	207	138	146	89	103	285	139	78	69	50	51	89
28	246	136	147	87	101	273	138	106	79	86	49	93
29	252	131	148	87	---	260	131	140	136	91	51	84
30	240	126	146	90	---	261	122	139	142	81	57	79
31	231	---	146	94	---	328	---	129	---	69	56	---
TOTAL	8783	4573	4063	3908	2881	6920	6660	2846	3203	2449	1551	1700
MEAN	283	152	131	126	103	223	222	91.8	107	79.0	50.0	56.7
MAX	632	219	149	170	106	330	390	140	161	130	80	93
MIN	177	122	113	87	96	100	78	66	68	33	34	38
CFSM	2.14	1.15	.99	.96	.78	1.69	1.68	.70	.81	.60	.38	.43
IN.	2.48	1.29	1.15	1.10	.81	1.95	1.88	.80	.90	.69	.44	.48

CAL YR 1981 TOTAL 42231 MEAN 116 MAX 632 MIN 24 CFSM .88 IN 11.90
WTR YR 1982 TOTAL 49537 MEAN 136 MAX 632 MIN 33 CFSM 1.03 IN 13.96

04170500 HURON RIVER NEAR NEW HUDSON, MI

LOCATION.--Lat 42°30'45", long 83°40'55", in NE¼ sec.1, T.1 N., R.6 E., Livingston County, Hydrologic Unit 04090005, on right bank 150 ft (46 m) downstream from Kent Lake Dam, 2 mi (3 km) upstream from Woodruff Creek, and 3 mi (5 km) west of New Hudson.

DRAINAGE AREA.--148 mi² (383 km²).

PERIOD OF RECORD.--August 1948 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 868.00 ft (264.566 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records fair. Occasional regulation by Kent Lake.

AVERAGE DISCHARGE.--34 years, 112 ft³/s (3.172 m³/s), 10.28 in/yr (261 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,080 ft³/s (30.6 m³/s) Dec. 29, 1950, gage height, 5.05 ft (1.539 m), from rating curve extended above 600 ft³/s (17.0 m³/s); minimum, 2.6 ft³/s (0.074 m³/s) May 27, 1963, gage height, 0.53 ft (0.162 m); minimum daily, 6.4 ft³/s (0.18 m³/s) May 7, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 452 ft³/s (12.8 m³/s) Oct. 3, gage height, 3.79 ft (1.155 m); minimum daily, 34 ft³/s (0.96 m³/s) Apr. 27; minimum gage height recorded, 0.67 ft (0.204 m) Apr. 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	316	221	146	165	124	117	326	140	250	138	77	76
2	399	240	144	163	122	119	347	130	208	126	79	74
3	442	267	148	162	123	118	335	120	184	126	84	72
4	438	280	147	172	121	125	336	120	167	136	85	69
5	396	302	142	178	120	126	325	115	112	132	83	68
6	373	270	141	180	120	124	316	110	84	130	78	68
7	354	226	139	177	119	122	293	100	105	118	77	69
8	325	280	141	172	118	121	280	100	127	111	75	68
9	306	267	140	172	117	122	271	110	128	104	71	65
10	288	210	135	163	116	121	265	120	128	104	59	56
11	274	277	133	161	115	126	265	110	123	126	56	51
12	259	264	132	160	115	136	260	100	117	113	52	50
13	240	270	131	160	117	177	257	97	111	103	48	49
14	224	280	133	160	118	222	251	95	100	99	47	51
15	213	245	134	160	117	259	247	92	96	100	47	54
16	205	211	136	157	120	284	241	90	103	88	49	51
17	192	206	139	145	119	306	217	86	98	62	49	50
18	182	189	142	140	120	295	165	82	96	56	47	61
19	187	197	143	135	119	270	119	80	112	60	43	60
20	186	196	144	133	120	301	93	75	123	58	46	58
21	197	188	147	129	121	315	112	75	135	54	49	55
22	205	177	156	126	118	318	98	79	133	53	45	56
23	206	170	167	120	116	320	117	85	122	49	50	58
24	206	166	165	116	115	321	117	87	113	44	53	63
25	200	157	163	113	115	321	114	86	110	40	75	74
26	197	154	163	112	117	316	100	87	106	41	73	77
27	205	155	165	113	117	302	34	91	94	42	72	87
28	221	157	165	118	117	299	100	110	102	74	69	89
29	229	154	165	124	---	210	150	133	143	85	65	88
30	230	150	163	122	---	243	150	152	145	86	70	83
31	227	---	163	120	---	205	---	218	---	83	79	---
TOTAL	8122	6526	4572	4528	3316	6781	6296	3275	3775	2741	1952	1919
MEAN	262	218	147	146	118	219	210	106	126	88.4	63.0	64.0
MAX	442	302	167	180	124	321	347	218	250	138	85	89
MIN	182	150	131	112	115	117	34	75	84	40	43	49
CFSM	1.77	1.47	.99	.99	.80	1.48	1.42	.72	.85	.60	.43	.43
IN.	2.04	1.64	1.15	1.14	.83	1.70	1.58	.82	.95	.69	.49	.48

CAL YR 1981 TOTAL 46494 MEAN 127 MAX 442 MIN 29 CFSM .86 IN 11.69
WTR YR 1982 TOTAL 53803 MEAN 147 MAX 442 MIN 34 CFSM .99 IN 13.52

STREAMS TRIBUTARY TO LAKE ERIE

04172000 HURON RIVER NEAR HAMBURG, MI

LOCATION.--Lat 42°27'55", long 83°48'00", in sec.24, T.1 N., R.5 E., Livingston County, Hydrologic Unit 04090005, on right bank at downstream side of bridge on Hamburg Road, 1.1 mi (1.8 km) north of Hamburg, and 3 mi (5 km) upstream from Strawberry Lake.

DRAINAGE AREA.--308 mi² (798 km²).

PERIOD OF RECORD.--October 1951 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 850.00 ft (259.080 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Aug. 12, 1953, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation by Kent Lake, 11 mi (18 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--31 years, 211 ft³/s (5.976 m³/s), 9.30 in/yr (236 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,560 ft³/s (44.2 m³/s) May 15, 1956; maximum gage height, 8.46 ft (2.579 m) June 30, 1968; minimum discharge, 32 ft³/s (0.91 m³/s) July 2, 3, 1965; minimum gage height, 3.16 ft (0.963 m) Aug. 1-3, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 927 ft³/s (26.3 m³/s) Mar. 19, gage height, 7.02 ft (2.140 m); minimum, 81 ft³/s (2.29 m³/s) Aug. 19, 20, 21, 22, 23, 24; minimum gage height, 3.77 ft (1.149 m) Sept. 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	349	397	284	240	240	276	665	234	357	303	156	127
2	490	390	289	235	240	210	732	235	425	288	149	127
3	481	396	291	265	240	206	787	231	440	277	144	122
4	806	415	297	264	240	210	803	225	415	278	142	115
5	856	427	300	272	240	220	781	218	385	278	141	112
6	856	442	297	275	240	230	755	212	330	272	138	110
7	822	449	294	275	240	240	717	219	273	264	134	109
8	778	426	294	334	240	240	672	248	259	249	131	107
9	721	403	289	350	240	236	630	255	254	232	129	105
10	664	408	279	340	240	199	593	251	248	220	123	101
11	607	391	269	330	240	216	569	243	240	244	115	99
12	548	369	268	310	240	237	556	235	230	263	109	96
13	493	387	254	290	240	293	545	239	220	264	101	93
14	445	388	250	270	240	367	530	227	207	259	97	92
15	413	401	251	260	240	456	513	214	192	251	94	95
16	391	392	252	250	240	625	500	201	192	240	93	95
17	368	372	256	250	240	785	499	191	189	226	91	93
18	347	350	255	250	240	887	487	183	185	207	88	103
19	327	333	255	240	240	921	456	177	199	192	84	109
20	315	335	240	240	230	904	403	174	224	185	84	110
21	318	344	280	240	230	883	345	171	262	175	84	106
22	330	341	320	235	230	855	323	167	272	164	82	107
23	342	333	350	235	220	826	299	171	269	157	81	110
24	348	323	340	235	220	803	288	177	252	148	83	112
25	353	313	330	230	225	780	278	176	235	137	94	120
26	356	304	310	230	240	756	273	172	223	131	108	132
27	361	304	279	230	250	729	233	174	211	129	113	149
28	367	298	264	235	246	701	216	197	212	134	114	165
29	377	293	256	240	---	634	223	235	277	153	113	166
30	385	285	248	240	---	584	231	270	306	162	116	161
31	390	---	245	240	---	614	---	297	---	162	121	---
TOTAL	15203	11004	8706	8130	6651	14071	14903	6619	7983	6644	3452	3448
MEAN	490	367	281	262	238	518	497	214	266	214	111	115
MAX	856	449	350	350	250	921	803	297	440	303	156	166
MIN	315	285	245	230	220	199	216	167	185	129	81	92
CFSM	1.59	1.19	.91	.85	.77	1.68	1.61	.70	.86	.70	.36	.37
IN.	1.84	1.33	1.05	.98	.80	1.94	1.80	.80	.96	.80	.42	.42

CAL YR 1981 TOTAL 92303 MEAN 253 MAX 856 MIN 69 CFSM .82 IN 11.15
WTR YR 1982 TOTAL 108814 MEAN 298 MAX 921 MIN 81 CFSM .97 IN 13.14

04173500 MILL CREEK NEAR DEXTER, MI

LOCATION.--Lat 42°18'00", long 83°53'55", in SW¼ sec.18, T.2 S., R.5 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 12 ft (4 m) downstream from bridge on Parker Road, 2.5 mi (4.0 km) south of Dexter, and 4 mi (6 km) upstream from mouth.

DRAINAGE AREA.--128 mi² (332 km²).

PERIOD OF RECORD.--February 1952 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft (259 m) from topographic map (nearest 10 ft). Prior to May 23, 1958, non-recording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--30 years, 79.4 ft³/s (2.249 m³/s), 8.42 in/yr (214 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,500 ft³/s (42.5 m³/s) June 26, 1968, gage height, 12.95 ft (3.947 m); minimum, 7.3 ft³/s (0.21 m³/s) Dec. 13, 1963; minimum gage height, 4.94 ft (1.506 m) Dec. 13, 1963, Feb. 22, 1964.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 500 ft³/s (14.2 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	2000	658	18.6	10.01	3.051	Mar. 31	1200	517	14.6	9.36	2.853
Mar. 14	1500	*1,230	34.8	*11.99	3.655						

Minimum discharge, 19 ft³/s (0.54 m³/s) Sept. 11, 12, 13; minimum gage height, 5.37 ft (1.637 m) Sept. 5, 11, 12, 13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	559	109	40	56	45	59	399	78	159	54	36	22
2	544	101	88	57	46	59	301	75	172	48	35	22
3	364	93	82	57	47	58	293	72	112	83	35	21
4	253	86	79	105	48	58	255	70	86	111	35	21
5	177	88	82	137	48	57	199	68	75	81	33	20
6	148	93	76	126	49	57	153	67	68	64	32	20
7	129	89	73	110	49	57	173	91	62	55	31	22
8	111	81	74	100	50	57	176	142	58	48	32	21
9	97	76	68	90	51	57	197	109	55	44	31	20
10	89	71	59	80	52	58	222	87	55	42	29	20
11	82	69	57	70	52	102	217	76	51	50	28	20
12	75	67	53	65	52	190	212	70	48	44	27	20
13	71	65	53	62	52	678	215	67	47	39	26	20
14	69	63	55	60	52	1190	186	63	44	37	25	27
15	70	63	56	59	52	1130	164	59	47	35	25	39
16	70	62	54	58	54	975	150	57	71	34	24	30
17	67	62	52	56	59	1040	176	56	60	37	24	27
18	70	62	50	55	57	999	169	53	53	39	23	34
19	75	63	48	54	58	873	149	51	71	38	23	31
20	70	116	46	52	58	744	143	49	84	38	24	28
21	72	161	46	51	62	704	130	50	118	35	23	27
22	120	133	47	50	65	594	115	59	91	31	22	30
23	156	111	48	49	72	536	108	72	71	31	23	29
24	131	99	51	48	68	492	100	66	60	30	22	26
25	110	91	50	47	65	431	94	61	54	30	24	29
26	99	87	50	47	60	366	92	58	51	31	23	29
27	127	102	50	46	60	277	89	62	51	33	23	40
28	217	93	51	46	59	234	83	95	57	84	22	47
29	176	84	51	46	---	222	81	83	90	64	22	38
30	144	76	52	45	---	245	78	69	67	46	22	34
31	123	---	52	45	---	486	---	63	---	39	22	---
TOTAL	4665	2616	1833	2029	1542	13125	5119	2198	2188	1475	826	814
MEAN	150	87.2	59.1	65.5	55.1	423	171	70.9	72.9	47.6	26.6	27.1
MAX	559	161	88	137	72	1190	399	142	172	111	36	47
MIN	67	62	46	45	45	57	78	49	44	30	22	20
CFSM	1.17	.68	.46	.51	.43	3.31	1.34	.55	.57	.37	.21	.21
IN.	1.36	.76	.53	.59	.45	3.81	1.49	.64	.64	.43	.24	.24

CAL YR 1981 TOTAL 38426 MEAN 105 MAX 800 MIN 25 CFSM .82 IN 11.17
WTR YR 1982 TOTAL 38430 MEAN 105 MAX 1190 MIN 20 CFSM .82 IN 11.17

04174500 HURON RIVER AT ANN ARBOR, MI

LOCATION.--Lat 42°17'10", long 83°44'00", in NW¼ sec.28, T.2 S., R.6 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 100 ft (30 m) upstream from bridge on Wall Street in Ann Arbor, 0.7 mi (1.1 km) downstream from Argo Dam, and 4.2 mi (6.8 km) upstream from Geddes Dam.

DRAINAGE AREA.--729 mi² (1,888 km²).

PERIOD OF RECORD.--February 1904 to current year. Monthly discharge only for some periods published in WSP 1307. Published as "at Geddes" February 1904 to December 1914 and as "at Barton" January 1914 to September 1940.

REVISED RECORDS.--WSP 874: 1938. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 744.81 ft (227.018 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). February 1904 to December 1914 at Geddes Dam, 4.2 mi (6.8 km) downstream, and January 1914 to September 1947 at Barton Dam, 2.6 mi (4.2 km) upstream, flow computed from records of operation of powerplants and records of depth of flow over dam and/or flow through undersluices.

REMARKS.--Records good. Diversion above station for Ann Arbor municipal supply had negligible effect on natural flow prior to 1955, figures of runoff adjusted since. Flow regulated by powerplants prior to May 1962. From June 1962 to 1975 occasional regulation for lake level control operations above station. Since 1975 extensive regulation of flow exists due to automation of gates at dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--78 years, 455 ft³/s (12.89 m³/s), 8.48 in/yr (215 mm/yr), adjusted for diversion since 1955.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 5,840 ft³/s (165 m³/s) Mar. 14, 1918; minimum daily, 4 ft³/s (0.11 m³/s) Aug. 2, Sept. 11, 1931 (plant leakage), but may be doubtful due to change in leakage.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,150 ft³/s (89.2 m³/s) Mar. 18, gage height, 15.95 ft (4.862 m); minimum daily, 93 ft³/s (2.63 m³/s) Sept. 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1640	723	526	450	336	433	2130	515	562	518	248	106
2	1310	855	548	407	388	434	1840	454	828	465	288	164
3	1220	800	544	466	400	423	1900	242	755	617	272	143
4	1170	683	554	514	380	368	1960	488	667	716	272	124
5	1440	688	561	563	370	309	1800	503	669	481	224	126
6	1190	736	539	573	370	381	1650	541	678	463	228	124
7	1480	751	541	544	470	407	1610	545	670	449	197	129
8	1090	734	541	473	420	429	1570	617	541	452	168	159
9	1110	718	535	470	390	435	1520	546	379	396	224	121
10	1020	765	503	387	380	419	1400	575	432	460	228	105
11	925	646	490	391	370	504	1420	533	482	410	212	98
12	892	630	481	408	350	622	1390	547	427	379	212	121
13	732	559	471	423	340	1200	1340	525	358	273	212	118
14	861	548	457	425	340	2200	1190	493	276	303	168	165
15	918	580	462	455	340	2620	1240	481	372	324	141	150
16	703	584	458	457	380	2870	1190	441	408	342	115	162
17	576	591	450	452	400	2900	1190	393	391	391	162	189
18	630	667	470	475	402	3080	1170	370	314	368	108	208
19	611	887	432	441	410	3060	1100	374	427	399	135	193
20	604	838	427	419	404	2940	1050	349	466	334	141	159
21	592	725	387	415	419	2980	853	362	555	206	135	170
22	680	689	427	444	457	2800	688	349	638	168	111	162
23	713	658	411	400	483	2630	613	394	482	252	125	138
24	697	453	403	402	459	2550	858	368	460	200	126	141
25	672	525	390	399	442	2410	837	356	460	276	143	165
26	603	565	448	362	390	2240	763	326	486	300	182	159
27	766	597	459	373	430	2090	633	380	462	260	110	334
28	828	617	465	345	422	1980	538	459	520	312	124	240
29	913	713	453	338	---	1780	517	424	608	380	110	93
30	623	559	415	336	---	1650	518	359	513	185	112	162
31	993	---	437	340	---	1930	---	372	---	236	98	---
TOTAL	28011	20024	14685	13347	11142	51274	36478	13681	15286	11315	5331	4628
MEAN	904	667	474	431	398	1654	1216	441	510	365	172	154
MAX	1440	887	561	573	483	3080	2130	617	828	716	288	334
MIN	576	453	387	336	336	368	517	242	276	168	98	93
MEAN +	922	685	489	448	416	1672	1234	462	531	389	196	177
CFSM +	1.26	.94	.67	.61	.57	2.29	1.69	.63	.73	.53	.27	.24
IN +	1.46	1.05	.77	.71	.59	2.64	1.89	.73	.81	.61	.31	.27

CAL YR 1981 TOTAL 283865 MEAN 554 MAX 2230 MIN 45 MEAN + 577 CFSM + .79 IN + 10.74
WTR YR 1982 TOTAL 225202 MEAN 617 MAX 3080 MIN 93 MEAN + 637 CFSM + .87 IN + 11.85

+ Adjusted for diversion for municipal supply; record furnished by City of Ann Arbor.

04174800 HURON RIVER AT YPSILANTI, MI

LOCATION.--Lat 42°14'57", long 83°36'45", in SW¼ sec.4, T.3 S., R.7 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 30 ft (9 m) downstream from bridge on Forest Avenue in Ypsilanti, 4.9 mi (7.9 km) downstream from Geddes Dam, 5.6 mi (9.0 km) upstream from Ford Dam, and at mile 42.8 (68.9 km).

DRAINAGE AREA.--807 mi² (2,090 km²).

PERIOD OF RECORD.--June 1974 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 700 ft (213 m) from topographic map (nearest 5 ft).

REMARKS.--Records good. Considerable regulation caused by many dams above station; storage capacity is small.

AVERAGE DISCHARGE.--8 years, 579 ft³/s (16.40 m³/s), 9.74 in/yr (247 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,300 ft³/s (122 m³/s) Mar. 5, 1976, gage height, 12.50 ft (3.810 m); minimum daily, 64 ft³/s (1.81 m³/s) Sept. 4, 1978.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,740 ft³/s (106 m³/s) Mar. 15, gage height, 12.10 ft (3.688 m); minimum daily, 110 ft³/s (3.12 m³/s) Sept. 29; minimum gage height, 6.68 ft (2.036 m) Aug. 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2240	900	697	587	417	511	2200	609	646	593	272	166
2	1600	1060	731	580	424	508	1890	532	961	596	379	244
3	1550	975	675	572	453	431	1990	315	818	797	318	131
4	1410	825	716	759	433	442	1990	557	781	857	320	209
5	1780	859	692	759	418	411	1840	618	771	595	280	173
6	1370	900	686	764	435	451	1730	602	770	520	270	208
7	1740	963	691	706	537	438	1650	733	776	532	250	202
8	1310	894	671	614	435	462	1650	716	649	506	200	166
9	1340	911	680	607	431	504	1630	716	463	488	260	196
10	1250	882	592	594	414	478	1520	614	473	532	270	202
11	1120	796	580	515	419	647	1540	583	541	572	260	137
12	1120	825	591	517	385	812	1500	614	547	467	250	212
13	917	713	558	520	385	1930	1480	571	498	326	250	179
14	1040	713	544	517	380	2910	1330	596	325	346	210	220
15	1020	724	592	533	382	3070	1330	524	419	355	180	247
16	900	741	545	539	437	3100	1320	541	500	386	140	227
17	724	741	543	559	453	3230	1360	432	442	433	180	249
18	825	791	569	564	435	3140	1310	428	498	477	130	335
19	825	992	522	491	459	3100	1230	431	402	485	179	251
20	780	1160	533	497	449	2920	1180	398	574	410	177	185
21	813	981	472	454	470	2960	985	373	649	262	192	196
22	888	888	540	467	534	2800	761	400	791	225	175	190
23	975	830	534	499	549	2600	672	425	560	277	183	180
24	900	621	502	478	579	2520	921	442	557	290	154	239
25	859	675	465	469	415	2450	939	414	511	313	175	271
26	796	709	525	424	379	2260	838	391	569	465	227	272
27	1080	790	594	426	459	2100	674	477	538	346	207	380
28	1190	780	588	418	474	2010	571	562	653	507	132	250
29	1100	855	547	397	---	1860	575	613	1180	399	158	110
30	1040	732	519	422	---	1770	595	451	635	270	174	200
31	998	---	533	431	---	2040	---	449	---	252	136	---
TOTAL	35500	25226	18227	16605	12440	54865	39281	16127	18407	13879	6688	6411
MEAN	1145	841	588	536	444	1770	1307	520	614	448	216	214
MAX	2240	1160	731	764	579	3230	2200	733	1180	857	379	380
MIN	724	621	465	397	379	411	571	315	325	225	130	110
CFSM	1.42	1.04	.73	.66	.55	2.19	1.62	.64	.76	.56	.27	.27
IN.	1.64	1.16	.84	.77	.57	2.53	1.81	.74	.85	.64	.31	.30

CAL YR 1981 TOTAL 243323 MEAN 667 MAX 2440 MIN 72 CFSM .83 IN 11.22
WTR YR 1982 TOTAL 263576 MEAN 722 MAX 3230 MIN 110 CFSM .90 IN 12.15

04176500 RIVER RAISIN NEAR MONROE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 41°57'38", long 83°31'52", Monroe County, Hydrologic Unit 04100002, on left bank 0.8 mi (1.3 km) downstream from bridge on Ida Mayhee Road, 5.0 mi (8.0 km) downstream from Saline River, and 7.5 mi (12.1 km) west of Monroe.

DRAINAGE AREA.--1,042 mi² (2,699 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1937 to current year. Published as "Raisin River at Monroe" 1937-52 and as "River Raisin at Monroe" 1952-53.

REVISED RECORDS.--WSP 954: 1938-40(M), 1941. WSP 1437: 1939, 1948. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 616.26 ft (187.836 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1953, at site 9 mi (14 km) downstream at datum 46.26 ft (14.100 m) lower.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Diurnal fluctuation caused by powerplants above station prior to June 27, 1968.

AVERAGE DISCHARGE.--45 years, 716 ft³/s (20.28 m³/s), 9.33 in/yr (237 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 15,300 ft³/s (433 m³/s) Mar. 16, 1982, gage height, 10.4 ft (3.17 m): maximum gage height, 11.16 ft (3.402 m) Mar. 15, 1982, backwater from ice; minimum discharge, about 2 ft³/s (0.06 m³/s) Sept. 4, 1938, Sept. 19, 20, 1941, site then in use.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,500 ft³/s (99.1 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 1	2100	4,360	123	6.81	2.076	Mar. 16	unknown	*15,300	433	10.4	3.17
Oct. 28	1400	3,790	107	6.41	1.954	Mar. 31	1300	3,610	102	6.28	1.914
Mar. 15	--	ice jam		*11.16	3.402						

Minimum discharge, 102 ft³/s (2.89 m³/s) Sept. 14, gage height, 2.10 ft (0.640 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3820	2170	752	440	480	500	3090	637	1270	901	210	126
2	3780	1600	792	470	400	490	3070	618	936	783	199	128
3	3250	1270	783	470	400	480	3080	594	790	716	192	122
4	3320	1100	769	600	410	480	2750	586	727	771	188	117
5	2850	1000	792	1250	420	480	2340	580	661	800	183	115
6	2190	968	770	1100	430	480	1970	561	629	705	183	113
7	1680	926	781	950	430	480	1760	537	589	611	175	116
8	1340	870	779	860	430	480	1660	535	546	513	179	117
9	1140	800	728	780	430	500	1730	555	512	439	176	121
10	990	737	673	720	430	600	1950	576	485	393	184	120
11	877	694	625	670	430	700	2030	585	449	366	201	114
12	814	652	575	600	430	1000	2170	574	409	371	167	111
13	751	616	541	560	430	2500	2230	556	398	375	172	110
14	718	580	519	530	430	5800	2100	537	381	362	165	111
15	712	562	518	500	430	11000	2000	504	366	338	157	116
16	640	550	509	480	450	14600	1860	466	412	325	149	112
17	610	544	490	470	460	14400	1760	435	418	297	142	116
18	616	533	477	460	470	12700	1690	425	447	273	140	143
19	598	530	448	450	480	10200	1650	424	433	262	138	154
20	610	732	430	440	500	8540	1590	417	459	267	152	170
21	592	1120	409	430	520	7790	1360	430	533	416	142	177
22	652	1120	386	420	540	6760	1220	444	613	438	144	177
23	1260	1100	396	410	560	6060	1090	534	573	342	155	181
24	1400	1020	420	400	580	5300	1000	625	525	293	150	177
25	1440	914	430	400	580	4800	932	666	463	264	145	177
26	1350	828	430	400	540	4440	867	625	413	250	139	177
27	1570	808	430	400	520	3840	810	706	371	240	135	207
28	3540	865	430	400	500	3370	760	2060	370	233	132	213
29	3120	777	430	400	---	2890	715	2180	791	228	127	220
30	3020	758	430	400	---	2540	668	2090	993	227	128	227
31	2760	---	430	400	---	3340	---	1820	---	216	129	---
TOTAL	52010	26684	17372	17260	13030	137640	51902	22882	16962	13015	4978	4385
MEAN	1678	889	560	557	465	4440	1730	738	565	420	161	146
MAX	3820	2170	792	1250	580	14600	3090	2180	1270	901	210	227
MIN	592	530	386	400	400	480	668	417	366	216	127	110
CFSM	1.61	.85	.54	.54	.45	4.26	1.66	.71	.54	.40	.16	.14
IN.	1.86	.95	.62	.62	.47	4.91	1.85	.82	.61	.46	.18	.16

CAL YR 1981 TOTAL 440681 MEAN 1207 MAX 12500 MIN 164 CFSM 1.16 IN 15.73
WTR YR 1982 TOTAL 378120 MEAN 1036 MAX 14600 MIN 110 CFSM .99 IN 13.50

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1966-72, 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: April 1978 to September 1981.
WATER TEMPERATURES: March 1966 to September 1972, April 1978 to September 1981.
SUSPENDED SEDIMENT DISCHARGE: March 1966 to September 1972.

INSTRUMENTATION.--Water-quality monitor Mar. 23 to July 13, 1981.

REMARKS.--Bimonthly samples collected at gaging station or at bridge .8 mi (1.3 km) upstream on Ida Maybee Road.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 1,020 micromhos Feb. 16, 1979; minimum daily recorded (water years 1978-81), 263 micromhos Jan. 25, 1981.
WATER TEMPERATURES: Maximum daily recorded (water years 1967, 1970-1972, 1978-80), 32.0°C July 18, 1972; minimum daily, 0.0°C on many days during winter periods.
SEDIMENT CONCENTRATIONS: Maximum daily 1,430 mg/L Dec. 22, 1967; minimum daily, 1 mg/L on several days in 1969 and 1970.
SEDIMENT LOADS: Maximum daily, 28,000 tons (25,400 tonnes) Dec. 22, 1967; minimum daily, 0.29 tons (0.26 tonnes) Aug. 31, 1971.

WATER QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV												
17...	1530	531	720	8.2	5.5	11.9	97	K140	130	350	92	103
JAN												
11...	1700	675	709	7.7	.0	13.5	95	390	E230	340	96	95
MAR												
22...	1300	6720	383	7.5	2.5	11.9	95	--	E4700	160	43	47
MAY												
18...	1315	422	686	8.3	23.5	9.5	114	K73	K1900	290	58	84
JUN												
14...	1200	382	673	8.2	22.5	12.0	141	E380	3000	320	79	92
SEP												
14...	1200	105	774	8.2	24.5	13.0	160	K160	2900	310	130	88

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
NOV												
17...	23	18	10	2.8	260	67	35	.2	6.8	474	423	.64
JAN												
11...	24	16	9	3.2	240	71	36	.2	8.7	438	399	.60
MAR												
22...	11	6.0	7	3.4	120	35	16	.2	5.3	232	196	.32
MAY												
18...	20	18	12	5.4	234	82	33	.3	2.8	374	386	.51
JUN												
14...	21	19	11	2.3	237	68	33	<.1	7.2	438	385	.60
SEP												
14...	23	36	20	6.8	180	140	48	.3	7.5	506	458	.69

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV												
17...	688	2.2	.040	.05	.68	.110	.34	.070	.040	22	32	100
JAN												
11...	798	4.2	.130	.17	.90	.110	.34	.050	.040	--	--	--
MAR												
22...	4210	2.2	.120	.15	.79	.180	.55	.100	.050	58	907	100
MAY												
18...	426	.68	.020	.03	.98	.110	.34	.040	.020	29	33	100
JUN												
14...	452	1.5	.010	.01	.60	.160	.49	.080	.050	36	37	100
SEP												
14...	143	.24	.080	.10	1.70	.150	.46	.060	<.010	8	2.3	100

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
JAN 11...	1700	1	0	--	50	--	2	10	<10	<1
MAR 22...	1300	1	1	<100	30	1	<1	30	<10	1
JUN 14...	1200	2	2	<100	65	1	<1	20	10	3
SEP 14...	1200	3	2	100	65	1	<1	10	<10	2

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
JAN 11...	<1	11	3	420	32	<1	<1	--	33	<.1
MAR 22...	<1	21	4	1000	68	30	<1	40	11	<.1
JUN 14...	3	9	4	940	15	4	1	60	4	.1
SEP 14...	<1	4	2	220	9	1	1	50	3	.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
JAN 11...	<.1	7	4	<1	<1	<1	<1	60	5
MAR 22...	<.1	7	4	<1	<1	<1	<1	20	5
JUN 14...	<.1	7	2	<1	<1	<1	<1	30	<4
SEP 14...	.1	6	6	<1	<1	<1	<1	10	<4

As the number of streams on which streamflow information is likely to be desired far exceeds the number of stream-gaging stations feasible to operate at one time, the Geological Survey collects limited stream-flow data at sites other than stream-gaging stations. When limited stream-flow data are collected on a systematic basis over a period of years for use in hydrologic analyses, the site at which the data are collected is called a partial-record station. Data collected at these partial-record stations are useable in low-flow or floodway analyses, depending on the type of data collected. In addition, discharge measurements are made at other sites not included in the partial-record program. These measurements are generally made in time of drought or flood to give better areal coverage to those events. Those measurements and others collected for some special reason are called measurements at miscellaneous sites.

Records collected at partial-record stations are presented in two tables. The first is a table of discharge measurements at low-flow partial-record stations and the second is a table of annual maximum stage and discharge at crest-stage stations. Discharge measurements made at miscellaneous sites for both low flow and high flow are given in a third table.

Low-flow partial-record stations

Measurements of streamflow in the area covered by this report made at low-flow partial-record stations are given in the following table. These measurements were made during periods of base flow when streamflow is primarily from ground-water storage. These measurements, when correlated with the simultaneous discharge of a nearby stream where continuous records are available, will give a picture of the low-flow potentiality of a stream. The column headed "Period of record" shows the water years in which measurements were made at the same, or practically the same, site.

Discharge measurements made at low-flow partial-record stations during water year 1982

Station No.	Station name	Location	Drainage area (mi²)	Period of Record	Measurements Date	Measurements Discharge (ft³/s)
		Streams tributary to Lake Superior				
*04032000	Presque Isle River near Tula, MI	Lat 46°32'49", long 89°46'38", in NW¼ sec.23, T.48 N., R.44 W., Gogebic County, at bridge on State Highway 28, 7 miles southwest of Merriweather, 5.5 miles downstream from Little Presque Isle River, and 2.0 miles east of Tula.	261	1945-73†, 1974-79c, 1980-82	04-18-82 04-27-82 07-21-82 08-17-82	b2,800 b2,170 b482 77.2
04044744	Munising Falls Creek at Munising, MI	Lat 46°25'28", long 86°37'27", in NW¼ SE¼ sec.36, T.47 N., R.19 W.. Alger County, at culvert, 0.3 mile upstream from mouth, at Munising.		1979-82	10-19-81 06-08-82	3.30 1.29
04044750	Miners River near Van Meer, MI	Lat 46°25'12", long 86°31'23", in SE¼ SW¼ sec. 35, T.47 N., R.18 W., Alger County, at culvert on County Road H-58, 2.5 miles west of Van Meer.		1979-82	10-22-81 06-08-82	13.9 9.47
04044755	Miners River near Munising, MI	Lat 46°29'18", long 86°32'26", in SW¼ NE¼ sec. 10, T.47 N., R.18 W., Alger County, at bridge on Pictured Rocks Trail road about 1 mile upstream from mouth and 7.5 miles northeast of Munising.		1979-82	10-22-81 06-08-82	29.0 31.8
04044762	Mosquito River near Melstrand, MI	Lat 46°31'07", long 86°28'41", in NW¼ NE¼ sec. 31, T.48 N., R.17 W., Alger County, 150 ft downstream from confluence with tributary from west, downstream from Mosquito Falls and 4.7 miles northwest of Melstrand.		1979-82	10-19-81 06-07-82	22.7 9.85
04044765	Chapel Creek near Melstrand, MI	Lat 46°32'54", long 86°26'20", in NE¼ NW¼ sec. 21, T.48 N., R.17 W., Alger County, 100 ft upstream from mouth and 6 miles north of Melstrand.		1979-82	10-19-81 06-07-82	18.6 4.50
04044766	Spray Creek near Melstrand, MI	Lat 46°33'27", long 86°24'38", in SE¼ NE¼ sec. 15, T.48 N., R.17 W., Alger County, 100 ft upstream from mouth and 6.5 miles north of Melstrand.		1979-82	10-19-81 06-07-82	13.8 4.51
04044770	Beaver Creek near Melstrand, MI	Lat 46°43'39", long 86°21'02", in NE¼ NE¼ sec. 7, T.48 N., R.16 W., Alger County, 0.7 mile downstream from Beaver Lake, 200 ft upstream from mouth and 8 miles northeast of Melstrand.		1979-82	10-20-81 06-08-82	34.5 22.7
04044775	Sevenmile Creek near Grand Marais, MI	Lat 46°37'15", long 86°15'31", in NW¼ NW¼, sec. 25, T.49 N., R.16 W., Alger County, 100 ft upstream from mouth and 13.5 miles west of Grand Marais.		1979-82	10-20-81 06-09-82	24.5 18.4
04044782	Sullivan Creek near Grand Marais, MI	Lat 46°39'19", long 86°11'02", in NW¼ SE¼ sec. 9, T.49 N., R.15 W., Alger County, at culvert 200 ft upstream from mouth on County Road H-58 and 9.5 miles west of Grand Marais.		1979-82	10-21-81 06-07-82	6.34 2.06
04044785	Hurricane River near Grand Marais, MI	Lat 46°39'48", long 86°09'57", in NW¼ NE¼ sec. 10, T.49 N., R.15 W., Alger County, at culvert 0.2 mile upstream from mouth, on County Road H-58 and 8.5 miles west of Grand Marais.		1979-82	10-21-81 06-07-82	29.2 12.0
04044786	Sable Creek near Grand Marais, MI	Lat 46°40'03", long 86°01'01", in SW¼ SE¼ sec. 2, T.49 N., R.14 W., Alger County, 150 ft upstream from path leading to Sable Falls and 1.5 miles southwest of Grand Marais.		1979-82	10-21-81 06-07-82	12.1 13.9
		Streams tributary to Lake Michigan				
04057580	Whitefish River near Rapid River, MI	Lat 45°57'56", long 86°55'15", in SE¼ NW¼ sec.10, T.41 N., R.21 W., Delta County, about 800 ft downstream from Chippeny Creek and 3.5 miles northeast of Rapid River.	284	1973-82	11-12-81 02-04-82 05-25-82 08-17-82	268 108 280 107

See footnotes at end of table.

Discharge measurements made at low-flow partial-record stations during water year 1982--Continued

Station No.	Station name	Location	Drainage area (mi²)	Period of record	Measurements Date	Measurements Discharge (ft³/s)
		Streams tributary to Lake Michigan--Continued				
04058120	Green Creek near Palmer, MI	Lat 46°22'22", long 87°36'21", in NW¼ sec.19, T.46 N., R.26 W., Marquette County, at bridge on County Highway 565, 4.5 miles south of Palmer.	d8.42	1961-65, 1970-82	01-27-82	b4.54
					05-20-82	b19.2
					06-07-82	b6.83
					07-14-82	b6.22
					08-30-82	b5.17
04059054	Escanaba River near Wells, MI	Lat 45°48'22", long 87°05'51", in SW¼ NW¼ sec. 1, T.39 N., R.23 W., Delta County, 600 ft downstream from Bichler Creek, 2.5 miles upstream from mouth and 2.0 miles northwest of Wells.	a920	1981-82	10-01-81	363
					01-14-82	441
					06-02-82	636
					06-29-82	462
					07-30-82	494
					08-13-82	510
					09-30-82	1,030
04096517	Hog Creek tributary near Allen, MI	Lat 41°57'33", long 84°49'33", in SW¼ SW¼ sec.7, T.6 S., R.4 W., Hillsdale County, at Squires Road, 0.3 mile upstream from mouth, 3.0 miles west of Allen.	2.61	1969-82	12-08-81	b6.04
					05-18-82	1.15
					06-22-82	1.45
					08-03-82	.90
04101700	Dowagiac Drain near Decatur, MI	Lat 42°04'26", long 86°01'51", in SW¼ sec.35, T.4 S., R.15 W., Van Buren County, at bridge on 50th Street, 3.7 miles southwest of Decatur.	21.9	1962-64, 1980-82	10-02-81	b90.7
					10-28-81	39.2
					11-16-81	30.8
					12-07-81	45.5
					01-28-82	35.5
					02-16-82	b35.4
					03-08-82	32.4
					03-13-82	b196
					04-12-82	b74.6
					04-19-82	b53.8
					05-11-82	33.8
					06-14-82	32.2
					07-20-82	b44.8
					08-10-82	25.1
					08-16-82	22.1
04101710	Lake of the Woods Drain near Decatur, MI	Lat 42°05'05", long 86°02'17", in NE¼ sec.34, T.4 S., R.15 W., Van Buren County, at culvert at 92nd Avenue, 3.5 miles southwest of Decatur.	13.1	1962-64, 1980-82	10-02-81	b23.4
					10-28-81	12.6
					11-16-81	8.46
					12-07-81	15.7
					02-16-82	b11.6
					03-08-82	14.1
					03-13-82	b67.5
					04-19-82	24.1
					05-11-82	12.6
					06-14-82	9.71
					07-20-82	b16.4
					08-10-82	6.68
					08-16-82	5.49
04102148	South Branch Paw Paw River near Paw Paw, MI	Lat 42°12'02", long 85°54'05", in NE¼ sec.23, T.3 S., R.14 W., Van Buren County, at 60th Avenue, 1.4 miles south of Paw Paw.	51.2	1980-82	10-02-81	b111
					10-27-81	66.4
					11-16-81	50.6
					12-07-81	70.7
					01-18-82	62.8
					02-16-82	63.7
					03-08-82	b57.6
					03-16-82	b269
					04-19-82	90.7
					05-12-82	60.2
					06-14-82	50.5
					07-21-82	b97.8
					08-11-82	48.9
					08-17-82	41.3
					08-27-82	39.8
04102178	East Branch Paw Paw River near Lawton, MI	Lat 42°41'50", long 85°50'33", in NW¼ sec.21, T.3 S., R.13 W., Van Buren County, at 30th Street, 1.5 miles north of Lawton.	26.9	1966, 1980-82	10-27-81	b23.7
					11-16-81	20.7
					12-07-81	22.0
					01-18-82	18.7
					02-16-82	b22.5
					03-08-82	b22.4
					03-16-82	b67.7
					04-19-82	31.7
					05-11-82	24.0
					06-14-82	23.9
					07-21-82	b37.5
					08-10-82	20.8

See footnotes at end of table.

Discharge measurements made at low-flow partial-record stations during water year 1982--Continued

Station No.	Station name	Location	Drainage area (mi²)	Period of record	Measurements Date	Measurements Discharge (ft³/s)
		Streams tributary to Lake Michigan--Continued				
04102180	East Branch Paw Paw River at Paw Paw, MI	Lat 42°12'45", long 85°53'15", in sec.13, T.3 S., R.14 W., Van Buren County, at bridge on State Highway 40 at Paw Paw.	31.5	1962-64, 1980-82	10-27-81	b33.2
					11-16-81	29.6
					12-08-81	b34.0
					01-18-82	36.2
					02-16-82	b32.0
					03-09-82	29.6
					04-19-82	45.6
					05-11-82	37.4
					06-14-82	33.6
					07-21-82	b54.7
					08-10-82	30.4
					08-17-82	28.0
					08-27-82	28.0
04102192	South Branch Paw Paw River at Paw Paw, MI	Lat 42°14'06", long 85°53'10", in SE¼ sec.1, T.3 S., R.14 W., Van Buren County, at 51st Avenue, 1.0 mile north of Paw Paw.	94.3	1980-82	10-27-81	90.2
					11-17-81	30.2
					12-08-81	b95.5
					01-19-82	92.0
					02-16-82	b95.8
					03-09-82	86.5
					04-19-82	161
					05-11-82	113
					06-15-82	b92.2
					07-21-82	b208
					08-10-82	67.3
					08-17-82	63.7
04102212	North Branch Paw Paw River near Paw Paw, MI	Lat 42°16'39", long 85°51'48", in SW¼ sec.20, T.2 S., R.13 W., Van Buren County, at bridge on 32nd Street, 4.3 miles northeast of Paw Paw.	37.8	1980-82	10-28-81	58.5
					11-17-81	49.2
					12-08-81	b59.2
					01-19-82	59.4
					02-17-82	65.2
					03-09-82	b50.8
					03-16-82	b253
					04-20-82	71.9
					05-12-82	46.6
					06-15-82	b47.0
					07-21-82	b121
					08-10-82	52.7
					08-17-82	40.5
04102217	Unnamed tributary to North Branch Paw Paw River near Paw Paw, MI	Lat 42°15'48", long 85°51'49", in SW¼ sec.29, T.2 S., R.13 W., Van Buren County, at 32nd Street, 3.5 miles northeast of Paw Paw.	17.6	1980-82	10-28-81	11.4
					11-17-81	11.5
					12-08-81	b13.4
					01-19-82	12.1
					02-17-82	b12.6
					03-09-82	b11.1
					03-16-82	b38.0
					04-20-82	17.6
					05-12-82	15.1
					06-15-82	b13.5
					07-22-82	b18.5
					08-10-82	14.0
					08-23-82	12.8
04102260	Brandywine Creek near Paw Paw, MI	Lat 42°16'50", long 85°53'53", in NE¼ sec.23, T.2 S., R.14 W., Van Buren County, at bridge on 38th Avenue, 4.4 miles north of Paw Paw.	32.2	1962-64, 1980-82	10-28-81	12.4
					11-17-81	7.68
					12-09-81	b18.5
					01-20-82	14.6
					02-17-82	b17.5
					03-09-82	b15.2
					03-16-82	b259
					04-20-82	29.0
					05-12-82	9.62
					06-15-82	b8.92
					07-22-82	34.2
					08-11-82	6.02
					08-18-82	4.75
04102370	Brush Creek at Lawrence, MI	Lat 42°13'10", long 86°02'36", in SW¼ sec.10, T.3 S., R.15 W., Van Buren County, at bridge on Red Arrow Highway at Lawrence.	39.9	1962-64, 1980-82	10-29-81	b25.2
					11-18-81	24.6
					12-09-81	b37.0
					01-20-82	34.0
					02-17-82	b33.9
					03-10-82	b31.6
					03-14-82	b186
					03-17-82	b225
					04-20-82	44.8
					05-12-82	31.3
					06-15-82	30.8
					07-22-82	b42.0
					08-11-82	25.3
					08-18-82	20.7

See footnotes at end of table.

Discharge measurements made at low-flow partial-record stations during water year 1982--Continued

Station No.	Station name	Location	Drainage area (mi²)	Period of record	Measurements Date	Measurements Discharge (ft³/s)
		Streams tributary to Lake Michigan--Continued				
04102392	Paw Paw River at Lawrence, MI	Lat 42°13'26", long 86°03'06", in NE¼ sec.9, T.3 S., R.15 W., Van Buren County, at 52nd Street in Lawrence.	265	1980-82	10-28-81	b337
					11-18-81	228
					12-09-81	b304
					01-20-82	292
					02-18-82	b346
					03-10-82	b276
					03-17-82	b2,000
					04-21-82	b463
					05-12-82	292
					06-16-82	b266
					07-22-82	b687
					08-11-82	200
					08-18-82	175
04102540	Brandywine Creek near Covert, MI	Lat 42°18'54", long 86°18'27", in NE¼ sec.8, T.2 S., R.17 W., Van Buren County, at bridge on old U.S. Highway 31, 2.7 miles northwest of Covert.	16.7	1962-64, 1980-82	10-28-81	b7.92
					11-20-81	b80.4
					12-14-81	b16.2
					01-27-82	9.66
					02-19-82	b18.5
					03-11-82	b36.9
					04-23-82	14.2
					05-11-82	6.27
					06-17-82	5.34
					07-23-82	7.75
					08-11-82	3.00
					08-23-82	2.13
04102545	Deerlick Creek near South Haven, MI	Lat 42°22'23", long 86°17'07", in NE¼ sec.21, T.1 S., R.17 W., Van Buren County, at 76th Street, 2.0 miles south of South Haven.	7.76	1962-64, 1980-82	10-28-81	1.46
					11-20-81	b44.2
					12-14-81	b6.66
					01-27-82	3.12
					02-19-82	b11.2
					03-11-82	b42.3
					04-23-82	4.29
					05-12-82	.90
					06-17-82	.89
					07-23-82	b3.58
					08-11-82	.13
04102575	Black River Drain near Bangor, MI	Lat 42°20'40", long 86°03'12", in NW¼ sec.34, T.1 S., R.15 W., Van Buren County, above confluence with Haven and Max Lake Drain, 125 feet upstream from 52nd Road, 3.8 miles northeast of Bangor.	23.6	1962-64, 1980-82	10-01-81	b40.6
					10-28-81	19.2
					11-18-81	12.6
					12-10-81	25.6
					01-21-82	22.9
					02-18-82	b25.3
					03-10-82	b20.5
					03-18-82	be424
					04-21-82	b33.0
					05-11-82	14.3
					06-16-82	14.5
					07-20-82	b272
					08-10-82	12.4
					08-19-82	9.90
04102590	Haven and Max Lake Drain near Bangor, MI	Lat 42°20'50", long 86°03'10", in SW¼ sec.27, T.1 S., R.15 W., Van Buren County, at culvert on 20th Road, 4.0 miles northeast of Bangor.	16.8	1962-64, 1980-82	10-01-81	b30.4
					10-27-81	13.4
					11-18-81	7.31
					12-10-81	14.2
					01-21-82	17.8
					02-18-82	17.4
					03-10-82	12.3
					03-18-82	bf107
					04-21-82	b18.6
					05-11-82	8.05
					06-16-82	7.94
					08-10-82	5.24
					08-19-82	3.34
04102618	South Branch Black River at Bangor, MI	Lat 42°18'56", long 86°06'48", in NE¼ sec.12, T.2 S., R.16 W., Van Buren County, at bridge on Railroad Street at Bangor.	52.4	1980-82	10-01-81	b79.5
					10-27-81	b45.3
					11-19-81	b32.0
					12-10-81	53.3
					01-21-82	49.8
					02-18-82	55.8
					03-10-82	b49.8
					04-22-82	66.1
					05-11-82	37.9
					06-16-82	33.8
					07-20-82	b371
					08-10-82	29.4

See footnotes at end of table.

Discharge measurements made at low-flow partial-record stations during water year 1982--Continued

Station No.	Station name	Location	Drainage area (mi²)	Period of record	Measurements Date	Measurements Discharge (ft³/s)
		Streams tributary to Lake Michigan--Continued				
04102720	Cedar Creek near South Haven, MI	Lat 42°21'15", long 86°11'17", in NW¼ sec.29, T.1 S., R.16 W., Van Buren County, at bridge on 16th Street, 4.6 miles southeast of South Haven.	17.6	1962-64, 1980-82	10-01-81	b69.4
					10-27-81	11.2
					11-19-81	6.40
					12-11-81	11.3
					01-22-82	12.2
					02-19-82	b25.9
					03-11-82	b29.7
					04-22-82	16.9
					05-11-82	7.40
					06-17-82	6.23
					07-19-82	b49.3
					08-10-82	3.98
					08-20-82	b2.76
04102731	South Branch Black River near South Haven, MI	Lat 42°25'10", long 86°14'24", in NW¼ sec.1, T.1 S., R.17 W., Van Buren County, at 71.5 Street, 1.0 mile east of South Haven.	132	1980-82	10-01-81	b297
					10-28-81	99.5
					12-14-81	b121
					03-14-82	b1,630
					04-22-82	187
					07-19-82	b1,240
04114594	Maple River near St. Johns, MI	Lat 43°02'43", long 84°28'11", in SE¼ SE¼ sec.30, T.8 N., R.1 W., Clinton County, at bridge on Colony Road, and 4.5 miles northeast of St. Johns.		1981-82	11-04-81	80.6
					12-17-81	55.2
					04-23-82	92.2
					06-03-82	b77.2
					08-27-82	21.7
04115450	Fish Creek at Carson City, MI	Lat 43°10'40", long 84°51'24", in SW¼ sec.12, T.9 N., R.5 W., Montcalm County, on downstream side of footbridge on park, 300 ft upstream of bridge on State Highway 57, at Carson City.	126	1974-82	12-17-81	89.9
04119061	Plaster Creek at Wyoming, MI	Lat 42°56'15", long 85°41'24", NE¼ sec.2, T.6 N., R.12 W., Kent County, at Godfrey St., at Wyoming.	57.1	1974-82	12-22-81	22.3
					01-27-82	20.8
					07-13-82	21.2
					08-24-82	16.9
*04120295	Black Creek near Muskegon, MI	Lat 43°12'14", long 86°09'52", in NE¼ NW¼ sec.1, T.9 N., R.16 W., Muskegon County, at bridge on Mill Iron Road, 4.8 miles east of Muskegon, and 4.9 miles upstream from mouth.	a39	1974-82	12-24-81	55.5
					04-12-82	b109
					06-28-82	56.6
					08-03-82	46.0
04126755	Platte River at M-22 near Honor, MI	Lat 44°42'39", long 86°07'08", in NE¼ SE¼ sec. 28, T.27 N., R.15 W., Benzie County, at bridge on State Highway 22, 0.4 mile downstream from Platte Lake and 6.2 miles northwest of Honor.	166	1946-48, 1957, 1979-82	10-28-81	160
					05-24-82	144
04126758	Platte River at Weir on Loon Lake Outlet near Honor, MI	Lat 44°43'12", long 86°08'12", in SW¼ SW¼ sec.21, T.27 N., R.15 W., Benzie County, at Department of Natural Resources fish weir, 0.6 mile downstream of Loon Lake and 7.2 miles northwest of Honor.	169	1979-82	10-28-81	156
					05-25-82	140
04126767	Otter Creek at Aral Road near Empire, MI	Lat 44°45'42", long 86°04'26", in SW¼ SW¼ sec.1, T.27 N., R.15 W., Benzie County, at culverts on Aral Road, 0.1 mile upstream from mouth and 3.5 miles south of Empire.	9.55	1979-82	10-27-81	b14.9
					05-25-82	b16.9
04126802	Crystal River near Glenn Arbor, MI	Lat 44°54'10", long 85°57'46", in SE¼ NE¼ sec. 23, T.29 N., R.14 W., Leelanau County, at culverts on County Highway 675, 3.7 miles upstream from mouth and 1.4 miles east of Glen Arbor.	42.0	1979-82	10-27-81	60.2
					05-26-82	34.4
04126810	Shalda Creek near Glen Arbor, MI	Lat 44°56'48", long 85°53'07", in SE¼ NW¼ sec.4, T.29 N., R.13 W., Leelanau County, at culverts on Lake Michigan Road, 0.1 mile upstream from mouth and 6.2 miles northeast of Glen Arbor.	33.8	1979-82	10-27-81	20.6
					05-26-82	23.1
		Streams tributary to Lake Huron				
04146450	North Branch Flint River near Columbiaville, MI	Lat 43°11'18", long 83°22'03", in NW¼ sec.24, T.9 N., R.9 E., Lapeer County, on downstream side of bridge on Barnes Lake Road.	--	1979-82	11-18-81	b128
					07-15-82	50.7
					08-26-82	75.4

* Also a crest-stage station.
† Operated as a continuous-record gaging station.
a Approximately.
b Not base flow.
c Operated as a crest-stage partial-record station.
d Since 1970, affected by diversion for industrial use.
e Discharge includes the flow in Haven and Max Lake Drain.
f Field estimate.

Crest-stage partial-record stations

The following table contains annual maximum discharge for crest-stage stations. A crest-stage gage is a device which will register the peak stage occurring between inspections of the gage. A stage-discharge relation for each gage is developed from discharge measurements made by indirect measurements of peak flow or by current meter. The date of the maximum discharge is not always certain, but is usually determined by comparison with nearby continuous-record stations, weather records, or local inquiry. Only the maximum discharge for each water year is given. Information of some lower floods may have been obtained but is not published herein. The years given in the period of record represent water years for which the annual maximum has been determined.

Annual maximum discharge at crest-stage partial-record stations during water year 1982

Station no.	Station name	Location	Drainage area (mi²)	Period of record	Annual maximum Date	Annual maximum Gage height (feet)	Annual maximum Discharge (ft³/s)
		Streams tributary to Lake Superior					
*04032000	Presque Isle River near Tula, MI	Lat 46°32'49", long 89°46'38", in NW¼ sec.23, T.48 N., R.44 W., Gogebic County, at bridge on State Highway 28, 7 miles southwest of Merriweather, 5.5 miles downstream from Little Presque Isle River, and 2.0 miles east of Tula.	261	1945-73‡, 1974-82	04-18-82	a12.84	3,000
04039500	South Branch Ontonagon River at Ewen, MI	Lat 46°31'58", long 89°16'37", in NW¼ sec.26, T.48 N., R.40 W., Ontonagon County, on piers of old State Highway 28 bridge, at Ewen.	348	1939-41, 1942-71‡, 1972-82	04-17-82	19.85	7,700
04041000	Perch River near Sidnaw, MI	Lat 46°31'06", long 88°39'48", in NE¼ sec.34, T.48 N., R.35 W., Baraga County, at State Highway 28, 2.5 miles east of Sidnaw.	63.1	1913-15‡, 1957-82	04-26-82	9.93	599
04044200	Carp Creek at Ishpeming, MI	Lat 46°29'11", long 87°41'21", in NW¼ sec.9, T.47 N., R.27 W., Marquette County, at bridge on Highway 41A, at Ishpeming.	16.5	1970-82	04-25-82	b7.97	195
04044813	Two Hearted River near Paradise, MI	Lat 46°41'57", long 85°25'19", in NW¼ SW¼ sec.27, T.50 N., R.9 W., Luce County, at foot bridge in State Forest Campground, 0.4 mile upstream from mouth, and 18 miles northwest of Paradise.	201	1973-82	04-27-82	c5.88	2,000
04045538	West Branch Waiska River near Brimley, MI	Lat 46°21'18", long 84°35'35", in SW¼ NW¼ sec.29, T.46 N., R.2 W., Chippewa County, at bridge on county road, 3.2 miles upstream from mouth, and 3.5 miles south of Brimley.	40.7	1973-82	04-09-80 04-04-81 04-25-82	9.18 7.98 8.66	d1,070 d629 803
04045559	East Branch Waiska River near Brimley, MI	Lat 46°25'07", long 84°28'24", in NW¼ NE¼ sec.6, T.46 N., R.1 W., Chippewa County, at bridge on county road, 4.0 miles upstream from mouth, and 4.7 miles east of Brimley.	31.9	1973-82	04-25-82	12.30	700
		Streams tributary to Lake Michigan					
04046000	Black River near Garnet, MI	Lat 46°07'05", long 85°21'55", in SE¼ sec.13, T.43 N., R.9 W., Mackinac County, on right bank 10 ft upstream from footbridge, 15 feet downstream from Peters Creek, 3.5 miles upstream from Lake Michigan and 4 miles southwest of Garnet.	28.0	1951-78‡, 1979-82	04-25-82	4.58	161
04049500	Manistique River at Germfask, MI	Lat 46°14'00", long 85°55'40", in SE¼ sec.4, T.44 N., R.13 W., Schoolcraft County, 600 feet upstream from bridge on State Highway 77, 1.0 mile south of Germfask.	341	1938-70‡, 1971-82	04-27-82	6.19	1,500
04057000	Indian River near Manistique, MI	Lat 45°59'30", long 86°17'15", in NE¼ sec.34, T.42 N., R.16 W., Schoolcraft County, at outlet of Indian Lake, 2.4 miles northwest of Manistique.	302	1938-71‡, 1972-82	05-01-82	5.28	884
04057900	Black River near Republic, MI	Lat 46°25'08", long 87°53'21", in NE¼ sec.2, T.46 N., R.29 W., Marquette County, at bridge on county road, 4.4 miles east of Republic.	34.4	1961-68‡, 1970-82	04-26-82	4.59	442
04059400	Tenmile Creek at Perronville, MI	Lat 45°48'38", long 87°22'00", in NW¼ NW¼ sec.2, T.39 N., R.25 W., Delta County, 1 mile northwest of Perronville.	38.4	1971-77‡, 1978-82	04-26-82	4.35	368
04062200	Peshekee River near Champion, MI	Lat 46°33'25", long 88°00'09", in NW¼ sec.13, T.48 N., R.30 W., Marquette County, on left bank 10 feet downstream from bridge on County Road 607, 0.6 mile downstream from West Branch and 3.5 miles northwest of Champion.	133	1961-78‡, 1979-82	04-26-82	6.84	2,730

See footnotes at end of table.

Annual maximum discharge at crest-stage partial-record stations during water year 1982--Continued

Station no.	Station name	Location	Drainage area (mi²)	Period of record	Annual maximum Date	Gage height (feet)	Discharge (ft³/s)
		Streams tributary to Lake Michigan--Continued					
04062300	Michigamme River at Republic, MI	Lat 46°23'03", long 87°58'48", in SE¼ sec.18, T.46 N., R.29 W., Marquette County, on left bank 400 feet upstream from county highway bridge, 0.3 mile upstream from Trout Falls Creek, and 0.6 mile south of Republic.	240	1961-75‡, 1976-82	05-07-82	6.43	2,730
04096272	Beebe Creek near Hillsdale, MI	Lat 41°57'15", long 84°38'20", in NE¼ NE¼ sec.15, T.6 S., R.3 W., Hillsdale County, 20 feet upstream from bridge on Moore Road, 1.2 miles northwest of Hillsdale.	42.4	1975-78‡, 1979-82	03-20-82	--	--
04096340	St. Joseph River at Clarendon, MI	Lat 42°07'51", long 84°51'56", in SW¼ SW¼ sec.11, T.4 S., R.5 W., Calhoun County, on left bank 5 feet upstream from bridge on 22 Mile Road at Clarendon.	144	1975-77‡, 1978-82	03-20-82	7.94	960
04097170	Portage River near Vicksburg, MI	Lat 42°06'53", long 85°29'08", in SW¼ sec.16, T.4 S., R.10 W., Kalamazoo County, on right bank 15 feet upstream from bridge on W Ave., 2.4 miles east of Vicksburg.	68.2	1947-51‡, 1965-79‡, 1980-82	03-21-82	5.48	292
04098500	Fawn River near White Pigeon, MI	Lat 41°46'56", long 85°39'00", in SW¼ sec.10, T.8 S., R.11 W., St. Joseph County, on right bank 0.3 mile downstream from bridge on county highway, 3.1 miles east of White Pigeon, and 3.5 miles upstream from Sherman Mill Creek.	192	1958-75‡, 1976-82	03-21-82	5.18	725
04108645	Rabbit River at Hamilton, MI	Lat 42°40'31", long 86°00'13", in NE¼ sec.6, T.3 N., R.14 W., Allegan County, at bridge on State Highway 40, at Hamilton.	274	1979-82	03-13-82	14.34	1,330
04112700	Sycamore Creek near Mason, MI	Lat 42°30'38", long 84°27'58", in NE¼ NE¼ sec.31, T.3 N., R.1 W., Ingham County, at bridge on Harper Road, 0.7 mile downstream from Aurelius and VeVey Drain, and 2.6 miles northwest of Mason.	39.5	1975-82	03-16-82	11.16	660
04113090	Carrier Creek near Grand Ledge, MI	Lat 42°43'36", long 84°39'16", in SE¼ SW¼ sec.15, T.4 N., R.3 W., Eaton County, at bridge on St. Joe Highway, 3.7 miles upstream from mouth, and 4.0 miles southeast of Grand Ledge.	7.18	1975-82	10-01-81	6.70	192
04117000	Quiker Brook near Nashville, MI	Lat 42°33'57", long 85°05'37", in NW¼ sec.13, T.2 N., R.7 W., Barry County, on left bank 150 feet upstream from culvert on county road, 300 feet upstream from small tributary, and 2.5 miles south of Nashville.	7.60	1955-75‡, 1976-82	03-13-82	6.01	243
04119055	Plaster Creek at Grand Rapids, MI	Lat 42°54'46", long 85°39'02", in SE¼ sec.7, T.6 N., R.11 W., Kent County, on right downstream side of bridge on 28th Street, at Grand Rapids.	46.6	1974-82	03-14-82	11.94	1,530
04119160	Buck Creek at Grandville, MI	Lat 42°54'09", long 85°45'46", in SE¼ sec.18, T.6 N., R.12 W., Kent County, on right downstream side of bridge on Wilson Avenue, at Grandville.	30.5	1974-82	03-14-82	9.27	1,070
*04120295	Black Creek near Muskegon, MI	Lat 43°12'14", long 86°09'52", in NW¼ NW¼ sec.1, T.9 N., R.16 W., Muskegon County, at bridge on Mill Iron Road, 4.8 miles east of Muskegon.	e39	1974-82	04-17-82	3.44	207
04122025	Muskegon River at Bridgeton, MI	Lat 43°20'50", long 85°56'22", in SE¼ NE¼ sec.34, T.11 N., R.14 W., Newaygo County, at bridge on Warner Road, in Bridgeton.	--	1979-82	04-04-82	12.87	4,790
04122223	Pentwater River near Hart, MI	Lat 43°43'27", long 86°22'36", in NW¼ SW¼ sec.5, T.15 N., R.17 W., Oceana County, at culverts on county road, 0.8 mile downstream from hydroelectric plant on Hart Lake, 1.8 miles northwest of Hart.	e78	1975-82	04-02-82	4.01	357
04122230	North Branch Pentwater River near Pentwater, MI	Lat 43°47'42", long 86°21'30", in NE¼ SE¼ sec.8, T.16 N., R.17 W., Oceana County, at bridge on U.S. Highway 31, 3.5 miles northeast of Pentwater.	e44	1975-82	04-02-82	3.00	258

See footnotes at end of table.

Annual maximum discharge at crest-stage partial-record stations during water year 1982--Continued

Station no.	Station name	Location	Drainage area (mi²)	Period of record	Annual maximum: Date	Annual maximum: Gage height (feet)	Annual maximum: Discharge (ft³/s)
		Streams tributary to Lake Michigan--Continued					
04123500	Manistee River near Grayling, MI	Lat 44°41'35", long 84°50'50", in SW¼ NW¼ sec.31, T.27 N., R.4 W., Crawford County, on right bank 25 feet upstream from bridge on State Highway 72, 6.8 miles northwest of Grayling.	131	1942-73‡, 1974-82	04-17-82	a1.29	299
04124500	East Branch Pine River near Tustin, MI	Lat 44°06'09", long 85°51'02", in NE¼ NW¼ sec.28, T.20 N., R.10 W., Osceola County, 75 feet downstream from highway bridge, 3.0 miles west of Tustin.	63	1953-63‡, 1964-82	03-25-82	4.55	292
04126200	Little Manistee River near Freesoil, MI	Lat 44°11'00", long 86°10'00", in NE¼ NE¼ sec.31, T.21 N., R.15 W., Manistee County, on right bank 25 feet upstream from Six Mile Bridge, 5.8 miles north of Freesoil, 7.4 miles upstream from mouth, and 9.0 miles southeast of Manistee.	200	1956-75‡, 1976-82	04-18-82	3.22	464
04126600	Betsie River near Benzonia, MI	Lat 44°56'02", long 86°05'57", in NW¼ NW¼ sec.2, T.25 N., R.15 W., Benzie County, at bridge on U.S. Highway 31, 1.2 miles south of Benzonia.	e170	1975-82	04-02-82	4.03	741
04127850	Boyne River near Boyne City, MI	Lat 45°11'48", long 84°57'20", in NW¼ SW¼ sec.5, T.32 N., R.5 W., Charlevoix County, at culvert on Dam Road, 0.3 mile downstream from nonoperative hydroelectric plant, 2.8 miles southeast of Boyne City.	e65	1975-82	04-17-82	3.36	297
		Streams tributary to Lake Huron					
04131500	Rainy River near Ocqueoc, MI	Lat 45°24'30", long 84°10'45", in NE¼ NW¼ sec.22, T.35 N., R.2 E., Presque Isle County, at bridge on North Allis Highway, 4.4 miles west of Ocqueoc, and 5.0 miles upstream from Black Lake.	e85	1952-79‡, 1980-82	04-17-82	4.26	398
04132500	Thunder Bay River near Hillman, MI	Lat 45°00'30", long 83°58'21", in NE¼ SE¼ sec.8, T.30 N., R.4 E., Montmorency County, on left bank 25 feet upstream from bridge on State Highway 32, 5.2 miles southwest of Hillman.	232	1946-72‡, 1973-82	04-18-82	6.79	438
04138000	East Branch Au Gres River at McIvor, MI	Lat 44°13'57", long 83°42'03", in NW¼ NW¼ sec.10, T.21 N., R.6 E., Iosco County, on right bank 25 feet downstream from bridge on Whittemore Road at McIvor, and 11.5 miles upstream from mouth.	e84	1950-73‡, 1974-82	03-31-82	6.64	548
04139000	Houghton Creek near Lupton, MI	Lat 44°25'43", long 84°02'50", in SE¼ SE¼ sec.10, T.23 N., R.3 E., Ogemaw County, 2.7 miles southwest of Lupton.	29.7	1950-72‡, 1973-82	03-31-82	5.91	423
04140200	Klacking Creek near Selkirk, MI	Lat 44°20'05", long 84°08'50", in NE¼ NE¼ sec.2, T.22 N., R.2 E., Ogemaw County, at bridge on Campbell Road, 4.0 miles northwest of Selkirk.	7.30	1953-82	03-31-82	1.42	69
04142000	South Branch Shepards Creek near Selkirk, MI	Lat 44°18'28", long 84°05'13", in SE¼ SE¼ sec.8, T.22 N., R.3 E., Ogemaw County on right bank 200 feet upstream from mouth, 600 feet west of bridge on Bedtelyon Road, and 1.1 miles southwest of Selkirk.	1.15	1951-78‡, 1979-82	03-31-82	3.66	82
04144180	Jones Creek near Gaines, MI	Lat 42°53'02", long 83°52'27", in SE¼ sec.28, T.6 N., R.5 E., Genesee County, at bridge on Baldwin Road, 1.7 miles northeast of Gaines.	7.60	1970-82	10-01-81	4.86	266
04144200	Porter Drain near Gaines, MI	Lat 42°53'26", long 83°50'59", in SE¼ sec.27, T.6 N., R.5 E., Genesee County, at bridge on Seymour Road, 3.2 miles east of Gaines.	4.68	1970-82	10-01-81	6.75	186
04144220	Jones Creek at Duffield, MI	Lat 42°54'03", long 83°54'27", in SE¼ sec.17, T.6 N., R.5 E., Genesee County, at bridge on Grand Blanc Road, 1.0 mile south of Duffield.	23.4	1970-82	10-01-81	10.5	650

See footnotes at end of table.

Annual maximum discharge at crest-stage partial-record stations during water year 1982--Continued

Station no.	Station name	Location	Drainage area (mi²)	Period of record	Annual maximum: Date	Annual maximum: Gage height (feet)	Annual maximum: Discharge (ft³/s)
		Streams tributary to Lake Huron--Continued					
04146020	South Branch Flint River near Millville, MI	Lat 43°04'44", long 83°18'25", in SW¼ sec.29, T.8 N., R.10 E., Lapeer County, on downstream right wingwall of bridge on Saginaw Road, 1.6 miles north of Lapeer.	160	1974-82	06-02-82	8.49	898
04147800	Powers-Cullen Drain near Genesee, MI	Lat 43°05'33", long 83°33'31", in SW¼ sec.18, T.8 N., R.8 E., Genesee County, at bridge on Coldwater Road, 3.3 miles southeast of Genesee.	9.17	1970-82	06-28-82	6.42	775
04147900	Lefler-Scothan Drain near Otisville, MI	Lat 43°08'11", long 83°32'27", in NE¼ sec.5, T.8 N., R.8 E., Genesee County, at bridge on Frances Road, 2.2 miles south of Otisville.	4.90	1970-82	10-01-81	6.78	149
04148120	Kearsley Creek near Atlas, MI	Lat 42°57'15", long 83°32'42", in NE¼ sec.5, T.6 N., R.8 E., Genesee County, at bridge on Jordan Road, 1.2 miles north of Atlas.	55.6	1970-82	03-13-82	7.40	570
04148139	Black Creek near Davison, MI	Lat 43°01'28", long 83°33'24", in SE¼ sec.7, T.7 N., R.8 E., Genesee County, at bridge on Irish Road, 2.0 miles west of Davison.	22.8	1970-82	10-01-81	8.39	427
04148144	Chipmunk Creek near Genesee, MI	Lat 43°04'01", long 83°36'59", in SE¼ sec.27, T.8 N., R.7 E., Genesee County, at culvert on Genesee Road, 3.1 miles south of Genesee.	5.09	1970-82	06-28-82	6.61	506
04148200	Swartz Creek near Holly, MI	Lat 42°49'39", long 83°37'42", in SW¼ sec.15, T.5 N., R.7 E., Oakland County, on right bank 25 feet downstream from bridge on Elliot Road, 2.4 miles north of Holly.	12.1	1956-75‡, 1976-82	06-01-82	3.56	83
04148255	Swartz Creek near Grand Blanc, MI	Lat 42°53'09", long 83°41'29", in SE¼ sec.25, T.6 N., R.6 E., Genesee County, at bridge on Baldwin Road, 4.1 miles southwest of Grand Blanc.	36.0	1970-82	10-01-81	5.05	169
04148260	Swartz Creek near Swartz Creek, MI	Lat 43°58'22", long 83°45'43", in SW¼ sec.28, T.7 N., R.6 E., Genesee County, at bridge on Bristol Road, 3.9 miles east of Swartz Creek.	67.5	1970-82	03-13-82	10.16	1,270
04148265	Kimball Drain near Swartz Creek, MI	Lat 42°55'15", long 83°49'51", in NE¼ sec.14, T.6 N., R.5 E., Genesee County, at bridge on Morrish Road, 2.4 miles south of Swartz Creek.	10.6	1970-82	10-01-81	9.08	465
04148270	West Branch Swartz Creek near Swartz Creek, MI	Lat 42°58'22", long 83°46'08", in SW¼ sec.28, T.7 N., R.6 E., Genesee County, at bridge on Bristol Road, 3.2 miles east of Swartz Creek.	40.6	1970-82	10-01-81	10.57	1,480
04148410	Thread Creek near Goodrich, MI	Lat 42°53'19", long 83°32'10", in SE¼ sec.29, T.6 N., R.8 E., Genesee County, at bridge on Baldwin Road, 2.4 miles southwest of Goodrich.	28.8	1970-82	03-13-82	4.98	235
04148600	Cole Creek near Flushing, MI	Lat 43°02'44", long 83°51'06", in SW¼ sec.35, T.8 N., R.5 E., Genesee County, at bridge on Potter Road, 1.2 miles south of Flushing.	8.51	1970-82	10-01-81	7.83	362
04148620	Freeman Drain near Montrose, MI	Lat 43°07'04", long 83°53'37", in SE¼ sec.5, T.7 N., R.5 E., Genesee County, at bridge on Mt. Morris Road, 4.0 miles south of Montrose.	8.21	1970-82	10-01-81	7.28	400
04148640	Armstrong Creek near Montrose, MI	Lat 43°08'04", long 83°50'03", in SE¼ sec.35, T.9 N., R.5 E., Genesee County, at bridge on Morrish Road, 4.1 miles southeast of Montrose.	11.9	1970-82	10-01-81	7.15	357
04148700	Central-Stadler Drain near Montrose, MI	Lat 43°09'46", long 83°50'14", in SE¼ sec.23, T.9 N., R.5 E., Genesee County, at bridge on Wilson Road, 3.1 miles east of Montrose.	15.0	1970-82	10-01-81	5.95	320

See footnotes at end of table.

Annual maximum discharge at crest-stage partial-record stations during water year 1982--Continued

Station no.	Station name	Location	Drainage area (mi²)	Period of record	Annual maximum Date	Gage height (feet)	Discharge (ft³/s)
		Streams tributary to Lake Huron--Continued					
04148800	Pine Run near Montrose, MI	Lat 43°12'42", long 83°48'54", in SE¼ sec.1, T.9 N., R.5 E., Genesee County, at bridge on Elms Road, 4.7 miles northeast of Montrose.	28.2	1970-82	10-01-81	9.79	723
04148900	Silver Creek near Clio, MI	Lat 43°12'50", long 83°45'55", in NW¼ sec.4, T.9 N., R.6 E., Genesee County, at bridge on Weir Road, 3.0 miles northwest of Clio.	3.70	1970-82	10-01-81	3.85	101
04149300	Misteguay Creek near Flushing, MI	Lat 43°01'31", long 83°54'41", in NE¼ sec.7, T.7 N., R.5 E., Genesee County, at bridge on Duffield Road, 3.7 miles southwest of Flushing.	17.3	1970-82	10-01-81	11.74	1,640
04151000	Cass River at Vassar, MI	Lat 43°22'15", long 83°34'52", in NW¼ SW¼ sec.7, T.11 N., R.8 E., Tuscola County, at bridge on State Highway 15, at Vassar.	710	1949-70‡, 1971-82	03-16-82	14.17	7,920
04153500	Salt River near North Bradley, MI	Lat 43°42'10", long 84°28'14", in NE¼ SE¼ sec.7, T.15 N., R.1 W., Midland County, at bridge on North Saginaw Road, 1.1 miles southeast of North Bradley.	138	1935-71‡, 1972-82	03-16-82	12.89	1,940
		Streams tributary to St. Clair River					
04160350	Pine River near Rattle Run, MI	Lat 42°52'40", long 82°34'04", in NE¼ sec.9, T.5 N., R.16 E., St. Clair County, on right downstream wingwall of bridge on Gratiot Road, 1.9 miles northeast of Rattle Run.	135	1974-82	10-01-81	21.21	3,560
		Streams tributary to Lake St. Clair					
04161500	Paint Creek near Lake Orion, MI	Lat 42°46'03", long 83°13'12", in NE¼ sec.13, T.4 N., R.10 E., Oakland County, on left bank 100 feet upstream from railroad bridge, 1.6 miles southeast of Lake Orion, and 2.8 miles upstream from Trout Creek.	38.5	1959-75‡, 1976-82	03-31-82	3.28	191
04161760	West Branch Stony Creek near Washington, MI	Lat 42°43'53", long 83°06'02", in SE¼ sec.25, T.4 N., R.11 E., Oakland County, at bridge on Huron-Clinton Metropolitan Park Road, and 3.4 miles west of Washington.	22.5	1965-82	03-31-82	3.53	191
04164010	North Branch Clinton River at Almont, MI	Lat 42°54'59", long 83°02'42", in NE¼ sec.28, T.6 N., R.12 E., Lapeer County, at bridge on State Highway 53, at Almont.	9.56	1959-62, 1963-68‡, 1969-82	10-01-81	6.00	361
04164050	North Branch Clinton River near Romeo, MI	Lat 42°49'11", long 82°58'35", in NW¼ sec.31, T.5 N., R.13 E., Macomb County, at bridge on 33 Mile Road, 2.2 miles northeast of Romeo.	49.7	1959-64, 1965-69‡, 1970-82	10-01-81	4.02	1,080
04164150	North Branch Clinton River near Meade, MI	Lat 42°43'50", long 82°54'23", in NE¼ sec.34, T.4 N., R.13 E., Macomb County, on left bank at bridge on 27 Mile Road, 1.9 miles northwest of Meade.	89.6	1959-67, 1968-72‡, 1973-82	03-14-82	7.20	2,580
04164200	Coon Creek near Armada, MI	Lat 42°47'41", long 82°52'58", in SW¼ sec.1, T.4 N., R.13 E., Macomb County, at bridge on North Road, 3.4 miles south of Armada.	10.0	1971-82	03-31-82	f5.74	462
04164350	Highbank Creek near Armada, MI	Lat 42°28'24", long 82°51'08", in NW¼ sec.6, T.4 N., R.14 E., Macomb County, at bridge on 32 Mile Road, 3.0 miles southeast of Armada.	14.9	1959-65, 1966-70‡, 1971-82	10-01-81	15.81	1,640
04164360	East Branch Coon Creek near New Haven, MI	Lat 42°45'46", long 82°50'57", in NW¼ sec.19, T.4 N., R.14 E., Macomb County, at bridge on 29 Mile Road, 3.4 miles northwest of New Haven.	36.1	1959-67, 1968-72‡, 1973-82	10-01-81	9.23	2,090
04164400	Deer Creek near Meade, MI	Lat 42°42'39", long 82°51'32", in NW¼ sec.6, T.3 N., R.14 E., Macomb County, at bridge on 25½ Mile Road, 0.9 mile southeast of Meade.	12.7	1959-60, 1961-65‡, 1966-82	03-31-82	7.95	471

See footnotes at end of table.

Annual maximum discharge at crest-stage partial-record stations during water year 1982--Continued

Station no.	Station name	Location	Drainage area (mi²)	Period of record	Annual maximum Date	Gage height (feet)	Discharge (ft³/s)
		Streams tributary to Lake St. Clair--Continued					
04164450	McBride Drain near Macomb, MI	Lat 42°41'14", long 82°55'14", in NE¼ NE¼ sec.16, T.3 N., R.13 E., Macomb County, at bridge on 24 Mile Road, 2.2 miles southeast of Macomb.	5.79	1960-64‡, 1965-82	03-31-82	9.27	166
04164600	Middle Branch Clinton River near Macomb, MI	Lat 42°42'03", long 82°59'44", in SE¼ sec.2, T.3 N., R.12 E., Macomb County, at bridge on Schoenherr Road, 2.0 miles west of Macomb.	22.2	1959-64, 1965-69‡, 1971-82	03-31-82	g10.57	714
04165200	Gloede Ditch near Waldenburg, MI	Lat 42°37'39", long 82°57'10", in SW¼ sec.32, T.3 N., R.13 E., Macomb County, 2.2 miles south of Waldenburg.	16.0	1959, 1960-64‡, 1965-82	03-31-82	17.71	496
		Streams tributary to Detroit River					
04167000	Middle River Rouge near Garden City, MI	Lat 42°20'55", long 83°18'45", in SW¼ NW¼ sec.6, T.2 S., R.10 E., Wayne County, on right bank 200 feet downstream from bridge on Inkster Road, 1.8 miles northeast of Garden City.	99.9	1931-33‡, 1948-77‡, 1978-82	10-01-81	9.71	1,970
04168660	Frank and Poet Drain at Trenton, MI	Lat 42°09'19", long 83°12'22", in NW¼ sec.13, T.4 S., R.10 E., Wayne County, at bridge on King Road, at Trenton.	19.3	1972-82	10-27-81	h8.30	310
		Streams tributary to Lake Erie					
04168800	Huron River near Andersonville, MI	Lat 42°41'35", long 83°29'56", in NW¼ SE¼ sec.3, T.3 N., R.8 E., Oakland County, on downstream side of culvert on White Lake Road, 2.5 miles south of Andersonville.	14.0	1974-82	04-01-82	2.68	84
04173250	Mill Creek near Lima Center, MI	Lat 42°15'56", long 83°56'45", in NE¼ sec.34, T.2 S., R.4 E., Washtenaw County, at Guenther Road, 2.0 miles upstream from North Fork Mill Creek, and 2.2 miles south of Lima Center.	47.3	1973-82	03-14-82	a10.72	i640
04175960	South Branch River Raisin near Adrian, MI	Lat 41°55'03", long 84°00'37", in SE¼ sec.25, T.6 S., R.3 E., Lenawee County, at Howell Highway, 2.0 miles northeast of Adrian.	165	1979-82	03-15-82	11.68	1,820
04176000	River Raisin near Adrian, MI	Lat 41°54'15", long 83°58'50", in NW¼ sec.5, T.7 S., R.4 E., Lenawee County, at Academy Road, 1.7 miles east of Adrian.	463	1954-78‡, 1979-82	03-15-82	15.77	6,660
04176400	Saline River near Saline, MI	Lat 42°07'50", long 83°46'35", in SW¼ sec.18, T.4 S., R.5 E., Washtenaw County, on right bank 20 feet downstream from bridge on Maple Road, 2.8 miles south of Saline.	94.6	1966-77‡, 1978-82	03-14-82	11.84	1,990

‡ Operated as a continuous-record gaging station.
* Also a low-flow partial-record station.
a Backwater from ice.
b Maximum gage height, 8.91 ft, Oct. 19, 1981, backwater from aquatic growth.
c Maximum gage height, 6.82 ft, time unknown, backwater from sand bar or ice.
d Revised.
e Approximately.
f Maximum gage height, 6.24 ft, March 13, 1982, backwater from ice.
g Maximum gage height, 11.50 ft, March 13, 1982, backwater from ice.
h Maximum gage height, 8.88 ft, Mar. 4, 1982, backwater from ice.
i Computed on basis of correlation with nearby stations.

Measurements of streamflow at points other than gaging stations or partial-record stations are given in the following table. Those that are measurements of base flow are designated by an asterisk (*).

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1982

Stream	Tributary to	Location	Drainage area (mi²)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft³/s)
		Streams tributary to Lake Superior				
Big Creek	Chocolay River	Lat 46°26'04", long 87°19'04", in SE¼ SW¼ sec.28, T.47 N., R.24 W., Marquette County, at culverts on county highway, 5.0 miles southeast of Harvey, MI.	17.0	1964-70†, 1979-81‡	11-05-81	*28.6
Cedar Creek	do	Lat 46°27'20", long 87°21'42", in NW¼ SW¼ sec. 19, T.47 N., R.24 W., Marquette County, 0.3 mile upstream from county highway, 2.5 miles south of Harvey, MI.	9.04	1979-81‡	11-05-81	*13.4
Cherry Creek	do	Lat 46°27'57", long 87°21'53", in NE¼ SE¼ sec. 13, T.47 N., R.25 W., Marquette County, 0.5 mile upstream from county highway 551, 2.0 miles south of Harvey, MI.	4.53	1966-70‡, 1971-79†, 1979-81‡	11-06-81	*19.4
Silver Creek	do	Lat 46°29'24", long 87°22'19", in NW¼ NE¼ sec. 12, T.47 N., R.25 W., Marquette County, at culverts on Silver Creek Road, 0.8 mile southwest of Harvey, MI.	8.58	1962-65, 1979-81‡	11-06-81	*8.97
		Streams tributary to Lake Michigan				
Goose Lake Outlet	East Branch Escanaba River	Lat 46°26'49", long 87°30'09", in NE¼ NW¼ sec.25, T.47 N., R.26 W., Marquette County, 4 miles east of Palmer, MI.	20.5	1962-64, 1976,1981	05-26-82	*20.2
do	do	Lat 46°26'26", long 87°30'39", in NE¼ SE¼ sec. 26, T.47 N., R.26 W., Marquette County, 3.8 miles east of Palmer, MI.	--	--	05-26-82	*23.2
do	do	Lat 46°25'58", long 87°30'36", in NW¼ sec.36, T.47 N., R.26 W., Marquette County, at bridge 3.7 miles east of Palmer, MI.	21.8	1960-65†, 1971,1976, 1981	05-26-82	*24.4
West Branch Sturgeon River	Sturgeon River	Lat 46°00'45", long 87°58'41", in NE¼ sec.30, T.42 N., R.29 W., Dickinson County, 500 ft downstream from bridge on county highway, 4.0 miles northeast of Randville, MI.	56.1	1949,1950, 1957,1958, 1958-81‡	10-14-81 10-19-81	*28.9 70.0
Skunk Creek	East Branch Sturgeon River	Lat 46°01'51", long 87°49'46", in SE¼ SE¼ sec.17, T.42 N., R.28 W., Dickinson County, 0.3 mile upstream from mouth, 2.2 miles north of Felch, MI.	14.5	1973-76, 1978-81	04-23-82	50.8
Unnamed tributary	Pine Creek	Lat 45°51'17", long 87°57'39", in SW¼ SW¼ sec. 13, T.40 N., R.30 W., Dickinson County, 3.8 miles northeast of Quinnesec, MI.	--	--	07-01-82	*0.22
Big Swan Creek	St. Joseph River	Lat 41°53'31", long 85°21'03", in NW¼ sec.3, T.7 S., R.9 W., St. Joseph County, at bridge on Needham Road, 3.5 miles northwest of Burr Oak, MI.	--	--	11-14-81 04-24-82 08-28-82	*b51 b122 *b18.0
Dowagiac Drain	Dowagiac River	Lat 42°05'10", long 85°58'26", in SW¼ sec.29, T.4 S., R.14 W., Van Buren County, at bridge on 44th Street, 1.0 mile south of Decatur, MI.	14.3	1980-81	10-28-81 11-16-81 05-11-82 08-10-82	24.8 *19.5 *23.1 *18.9
Osborne Drain	do	Lat 42°04'20", long 86°05'20", in SW¼ sec.32, T.4 S., R.15 W., Van Buren County, at culvert on 56th Street, 5.0 miles southeast of Keeler, MI.	15.5	1962-64, 1980-81	10-28-81 05-11-82 08-10-82	*4.89 *7.88 *6.82
Eagle Lake Drain	Gates Drain	Lat 42°10'18", long 85°55'00", in NW¼ NW¼ sec. 35, T.3 S., R.14 W., Van Buren County, at bridge at intersection of 38th Street and 68th Avenue, 3.5 miles west of Lawton, MI.	14.3	1980-81	10-27-81 05-12-82 08-11-82	*14.5 *17.5 *15.4
Gates Drain	South Branch Paw Paw River	Lat 42°10'18", long 85°54'30", in NW¼ sec.35, T.3 S., R.14 W., Van Buren County, at bridge on 68th Street, 3.0 miles west of Lawton, MI.	40.4	1962-64, 1980-81	10-27-81 05-12-82 08-11-82	*53.3 *51.0 *43.9

See footnotes at end of table.

DISCHARGE MEASUREMENTS AT MISCELLANEOUS SITES DURING WATER YEAR 1982--CONTINUED

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
		Streams tributary to Lake Michigan--continued				
Gates Drain	South Branch Paw Paw River	Lat 42°11'08", long 85°54'20", in NW¼ NE¼ sec. 26, T.3 S., R.14 W., Van Buren County, south of 64th Ave., 1.8 miles south of Paw Paw, MI.	--	--	08-27-82	*37.0
Three Mile Lake Drain	Gates Drain	Lat 42°11'44", long 85°55'00", in SW¼ NW¼ sec. 25, T.3 S., R.14 W., Van Buren County at Paw Paw Road, 1.3 miles southwest of Paw Paw, MI.	--	--	08-27-82	*2.28
East Branch Paw Paw River	South Branch Paw Paw River	Lat 42°40'30", long 85°47'22", in SE¼ sec.26, T.3 S., R.13 W., Van Buren County, at bridge on 24th Street, 3.0 miles east of Lawton, MI.	9.20	1980-81	10-27-81 05-11-82 08-10-82	*8.44 *7.15 *6.81
Cook Drain	East Branch Paw Paw River	Lat 42°42'30", long 85°49'25", in NW¼ SW¼ sec. 15, T.3 S., R.13 W., Van Buren County, at bridge on 28th Avenue, 2.0 miles west of Mattawan, MI.	10.6	1970, 1980-81	10-27-81 05-11-82 08-10-82	*1.61 *1.80 *.94
Brandywine Creek	North Branch Paw Paw River	Lat 42°18'53", long 85°54'30", in NW¼ NW¼ sec.11, T.2 S., R.14 W., Van Buren County, at bridge on 37th Street, 3.4 miles south of Gobles, MI.	9.05	1962-64, 1980-81	10-27-81 05-11-82 08-10-82	*2.85 *2.20 *1.26
North Extension Drain	Brandywine Creek	Lat 42°19'01", long 85°55'10", in SE¼ SE¼ sec.3, T.2 S., R.14 W., Van Buren County, at bridge at 28th Street, 3.7 miles southwest of Gobles, MI.	10.7	1980-81	10-27-81 05-11-82 08-10-82	*4.52 *2.12 *.68
Brush Creek	Red Creek	Lat 42°09'24", long 86°03'20", in NE¼ sec.4, T.4 S., R.15 W., Van Buren County, at bridge on 72nd Avenue, 4.5 miles south of Lawrence, MI.	16.0	1962-64, 1980-81	10-28-81 05-12-82 08-10-82	*10.7 *12.6 *9.91
Red Creek	Paw Paw River	Lat 42°10'10", long 86°04'15", in NE¼ sec.33, T.3 S., R.15 W., Van Buren County, at bridge at 54th Street, 3.5 miles south of Lawrence, MI.	6.89	1962-64, 1980-81	10-29-81 05-12-82 08-11-82	*2.40 *2.16 *2.11
Pine Creek	do	Lat 42°12'20", long 86°10'55", in SW¼ sec.16, T.3 S., R.16 W., Van Buren County, at bridge at Highway 12, 1.0 mile west of Hartford, MI.	9.67	1980-81	10-29-81 05-12-82 08-11-82	*5.72 *4.68 *4.67
Haven and Max Lake Drain	South Branch Black River	Lat 42°22'25", long 85°59'11", in NE¼ NW¼ sec.19, T.1 S., R.14 W., Van Buren County, at bridge at 45th Street, 1.0 mile southwest of Bloomingdale, MI.	9.34	1973, 1981	10-28-81 05-12-82 08-11-82	*5.81 *4.45 *2.70
do	do	Lat 42°22'08", long 86°00'01", in SW¼ NE¼ sec.24, T.1 S., R.15 W., Van Buren County, at bridge at 46½ Street, 2.0 miles southwest of Bloomingdale, MI.	12.3	1980-81	10-28-81 05-12-82 08-10-82	*8.76 *6.41 *3.47
South Branch Black River	Lake Michigan	Lat 42°24'54", long 86°13'31", in NE¼ sec.1, T.1 S., R.17 W., Van Buren County, at bridge on 70th Street, 2.0 miles northeast of South Haven, MI.	130	1962-64, 1981	11-19-81 02-19-82 03-11-82 05-12-82 06-17-82 08-10-82 08-20-82	66.2 179 203 *71.9 *85.8 *60.1 *52.6
Middle Branch Black River	Black River	Lat 42°25'09", long 86°02'25", in NW¼ sec.3, T.1 S., R.15 W., Van Buren County, at bridge at Baseline Road, 5.5 miles northwest of Bloomingdale, MI.	5.01	1980-81	10-28-81 05-12-82 08-11-82	*4.39 *2.50 *2.38
Melvin Creek	Middle Branch Black River	Lat 42°24'33", long 86°00'35", in NE¼ NW¼ sec.1, T.1 S., R.15 W., Van Buren County, at bridge at 47½ Street, 3.2 miles northwest of Bloomingdale, MI.	7.10	1962-64, 1980-81	10-28-81 05-12-82 08-11-82	*4.66 *3.74 *2.27
Barber Creek	do	Lat 42°25'09", long 86°03'40", in SW¼ sec.34, T.1 N., R.15 W., Allegan County, at bridge on Baseline Road, 1.1 miles east of Grand Junction, MI.	7.71	1962-64, 1980-81	10-28-81 05-12-82 08-11-82	*7.09 *6.60 *6.38
Battle Creek	Kalamazoo River	Lat 42°21'29", long 85°08'00", in SE¼ NW¼ sec. 28, T.1 S., R.7 W., Calhoun County, 0.95 miles northeast of Fruin Corners in Battle Creek, MI.	--	--	07-09-82 09-07-82	*102 *56.4

See footnotes at end of table.

DISCHARGE MEASUREMENTS AT MISCELLANEOUS SITES DURING WATER YEAR 1982--CONTINUED

Stream	Tributary to	Location	Drainage area (mi²)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft³/s)
		Streams tributary to Lake Michigan--continued				
Pine Creek	Baseline Creek	Lat 42°24'40", long 85°46'15", in SE¼ sec.1, T.1 S., R.13 W., Van Buren County, at bridge at 2nd Avenue, 6.5 miles northeast of Gobles, MI.	9.61	1980-81	10-27-81 05-12-82 08-11-82	*40.9 *31.4 *34.7
North Branch Macatawa River	Macatawa River	Lat 42°47'00", long 86°02'18", in SE¼ sec.26, T.5 N., R.15 W., Ottawa County, at bridge on Adams Road, 1.5 miles southwest of Zeeland, MI.	--	--	06-09-82 07-06-82	*b1.5 *b.56
Bosch and Hulst Drain	Macatawa River	Lat 42°48'46", long 86°02'18", in SW¼ SW¼ sec. 13, T.5 N., R.15 W., Ottawa County, at the end of 104th Street in Zeeland, MI.	--	--	04-22-82 05-13-82 06-09-82 07-06-82	b9.70 b3.62 *b2.4 *b1.83
Pine Creek	Lake Macatawa	Lat 42°48'42", long 86°08'59", at sec.13/24, T.5 N., R.16 W., Ottawa County, at bridge on James Street, 2.0 miles north of Holland, MI.	--	--	04-22-82 05-13-82 06-09-82 07-06-82	b26 b11 *b11 *b7.78
Maple River cut-off channel	Grand River	Lat 43°08'48", long 84°26'05", at sec.21/28, T.9 N., R.1 W., Gratiot County, at bridge on Taft Road, 1.0 mile northwest of Bannister, MI.	--	--	06-08-82	*b51
Maple River	Grand River	Lat 43°08'43", long 84°30'12", at sec.25/26, T.9 N., R.2 W., Gratiot County, at bridge on Blair Road, 4.0 miles west of Bannister, MI.	--	--	06-08-82	*b62
Flat River	Grand River	Lat 42°58'16", long 85°20'13", NE¼ sec.26, T.7 N., R.9 W., Kent County below Tallassburg Dam, 1.8 miles north of Lowell, MI.	--	--	08-17-82	c21.0
Otter Creek	Lake Michigan	Lat 44°44'32", long 86°03'41", in SE¼ NE¼ sec. 13, T.27 N., R.15 W., Benzie County, at outlet of Otter Lake, 1.8 miles upstream from mouth, and 4.8 miles south of Empire, MI.	1.2	1979-81	10-26-81 05-24-82	*3.36 *5.00
Intermediate River	Lake Bellaire	Lat 45°58'42", long 85°12'30", in SE¼ SE¼ sec. 24, T.30 N., R.8 W., Antrim County, at bridge on State Highway 88 in Bellaire, MI.	--	--	05-19-82	*b137
Grass Creek	Torch Lake	Lat 44°58'48", long 85°15'10", in NE¼ SE¼ sec. 22, T.30 N., R.8 W., Antrim County, at bridge on Bellaire Highway, 2.2 miles west of Bellaire, MI.	--	--	05-19-82	*b0.42
		Streams tributary to Lake Huron				
Pickerel Lake Outlet	Crooked Lake	Lat 45°24'47", long 84°47'33", in NE¼ SE¼ sec. 21, T.35 N., R.4 W., Emmet County, 300 ft upstream from Crooked Lake, 3.5 miles east of Conway, MI.	--	--	09-22-82	*b45.9
Minnehaha Creek	do	Lat 45°23'52", long 84°48'57", in NE¼ SE¼ sec.29, T.35 N., R.4 W., Emmet County, at bridge on Channel Road, 2.5 miles southeast of Conway, MI.	--	--	05-20-82 09-21-82	*b39.0 *b35.7
Round Lake Outlet	do	Lat 45°24'30", long 84°51'57", in NE¼ SW¼ sec. 24, T.35 N., R.5 W., Emmet County, at bridge on U.S. Highway 31, 0.5 mile south of Conway, MI.	--	--	05-20-82 09-21-82	*b5.95 *b5.01
Unnamed tributary	do	Lat 45°25'17", long 84°51'49", in SW¼ SE¼ sec. 13, T.35 N., R.5 W., Emmet County, at bridge on U.S. Highway 31, 0.5 mile east of Conway, MI.	--	--	05-20-82	*b.53
do	do	Lat 45°25'28", long 84°51'15", in SE¼ SE¼ sec. 13, T.35 N., R.5 W., Emmet County, at bridge on U.S. Highway 31, 1.0 mile east of Conway, MI.	--	--	05-20-82	*b2.52
Oden Hatchery Outfall	do	Lat 45°25'26", long 85°50'40", in SE¼ SW¼ sec. 18, T.35 N., R.4 W., Emmet County, at bridge on U.S. Highway 31, at State Fish Hatchery, 0.9 mile west of Oden, MI.	--	--	05-20-82 09-21-82	*b9.70 *b8.91

See footnotes at end of table.

DISCHARGE MEASUREMENTS AT MISCELLANEOUS SITES DURING WATER YEAR 1982--CONTINUED

Stream	Tributary to	Location	Drainage area (mi²)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft³/s)
		Streams tributary to Lake Huron--continued				
Oden Hatchery Overflow	Crooked Lake	Lat 45°25'28", long 85°50'40", in SE¼ SW¼ sec.18, T.35 N., R.4 W., Emmet County, at bridge on U.S. Highway 31, at State Fish Hatchery, 0.9 mile west of Oden, MI.	--	--	09-21-82	*b0.70
Crooked River	Burt Lake	Lat 45°26'36", long 84°47'00", in SE¼ NW¼ sec.10, T.35 N., R.4 W., Emmet County, at bridge on State Highway 68, in Alanson, MI.	--	--	05-20-82 09-21-82	*96.0 *141
Upper Tomahawk Lake Outlet	West Branch Upper Rainy River	Lat 45°11'00", long 84°04'30", in NE¼ NW¼ sec.9, T.32 N., R.3 E., Montmorency County, at bridge on Forest Road, 0.2 mile above Rainy River Flooding, 10.3 miles south of Millersburg, MI.	--	--	07-26-82	*b0.32
West Branch Upper Rainy River	Rainy Lake	Lat 45°17'09", long 84°05'30", in SE¼ SE¼ sec.32, T.33 N., R.3 E., Presque Isle County, 0.5 mile below Rainy River Flooding, 9.3 miles south of Millersburg, MI.	--	--	07-27-82	*b1.09
do	do	Lat 45°14'25, long 84°04'09", in NE¼ NE¼ sec. 21, T.33 N., R.3 E., Presque Isle County, at bridge on South Shore Drive, 6.4 miles south of Millersburg, MI.	--	--	08-03-82 09-21-82	b5.13 *8.54
Healy Creek	West Branch Upper Rainy River	Lat 45°19'25", long 84°04'00", in NE¼ NE¼ sec.21, T.33 N., R.3 E., Presque Isle County, at bridge on South Shore Drive, 6.4 miles south of Millersburg, MI.	--	--	07-27-82 08-03-82 09-21-82	*b1.37 b1.73 *2.82
West Branch Upper Rainy River	Rainy Lake	Lat 45°14'41", long 84°03'56", in NE¼ SE¼ sec.16, T.33 N., R.3 E., Presque Isle County, 300 ft upstream from Rainy Lake, 6.0 miles south of Millersburg, MI.	--	--	07-27-82	*b2.59
South Branch Shiawassee River	Shiawassee River	Lat 42°36'57", long 83°57'54", in SE¼ SW¼ sec.27, T.3 N., R.4 E., Livingston County, at bridge on Grand River Road, 1.2 miles northwest of Howell, MI.	--	1973, 1974, 1977	03-25-82 05-27-82 06-17-82 09-28-82	b77 b11 b14.8 b15.9
South Branch Shiawassee River	Shiawassee River	Lat 42°38'12", long 83°58'02", in sec.22, T.3 N., R.4 E., Livingston County, at bridge on Bowen Road, 2.0 miles northwest of Howell, MI.	--	--	03-25-82 05-27-82 06-17-82 09-28-82	b80 b12.6 b17.5 b20.4
South Branch Shiawassee River	Shiawassee River	Lat 42°43'22", long 83°59'02", in sec.21, T.4 N., R.4 E., Livingston County, at bridge on Steinacker Road, 8.0 miles northwest of Howell, MI.	--	--	03-25-82 05-27-82 06-17-82	b177 b18 b23
Sprague Creek	South Branch Shiawassee River	Lat 42°44'38", long 84°00'06", in sec.15, T.4 N., R.4 W., Livingston County, at bridge on Gannon Road, 4.5 miles northwest of Oak Grove, MI.	--	--	03-25-82	b90
South Branch Shiawassee River	Shiawassee River	Lat 42°43'33", long 83°56'55", in NW¼ sec. 23, T.4 N., R.4 E., Livingston County, at bridge on Oak Grove Road, 2.0 miles north of Oak Grove, MI.	--	--	05-27-82 06-17-82	b33 b39
Bad River	Shiawassee River	Lat 43°17'48", long 84°13'45", in NW¼ sec.3, T.10 N., R.2 E., Saginaw County, at Hemlock Road, 2.5 miles north of Brant, MI.	a89	1949-50‡, 1980-81	12-09-81	b42.7
McClellen Run	Swan Creek	Lat 43°25'54", long 84°10'14", at sec.24/19, T.12 N., R.3 E., Saginaw County, at bridge on Orr Road, 3.0 miles east of Hemlock, MI.	--	--	12-09-81	b4.57
do	do	Lat 43°26'05", long 84°09'03", at sec.19/20, T.12 N., R.3 E., Saginaw County, at bridge on Gleaner Road, 4.0 miles east of Hemlock, MI.	--	--	12-09-81	b5.72
Flint River	Shiawassee River	Lat 43°00'54", long 83°41'46", in NE¼ NE¼ sec.13, T.7 N., R.6 E., Genesee County, at bridge on Grand Traverse Street, in the city of Flint, MI.	--	1981	11-30-81 12-03-81	837 837

See footnotes at end of table.

DISCHARGE MEASUREMENTS AT MISCELLANEOUS SITES DURING WATER YEAR 1982--CONTINUED

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
		Streams tributary to Lake Huron--Continued				
Mud Creek	Flint River	Lat 43°03'17", long 83°50'02", in NE¼ sec.35, T.8 N., R.5 E., Genesee County, at culvert on Morrish Road, 1.0 mile southeast of Flushing, MI.	--	--	03-23-82 03-24-82 03-25-82	12.1 11.3 8.44
Flint River	Shiawassee River	Lat 43°03'47", long 83°51'25", in SE¼ SE¼ sec.27, T.8 N., R.5 E., Genesee County, at bridge on Main Street, in the city of Flushing, MI.	--	1954, 1959,1981	12-01-81 12-03-81	1,150 1,080
Cole Creek	Flint River	Lat 43°03'56", long 83°51'55", in NE¼ SW¼ sec.27, T.8 N., R.5 E., Genesee County at culvert on Seymour Road, 0.5 miles west of Flushing, MI.	--	--	03-23-82 03-24-82 03-25-82	17.3 18.8 13.9
Flint River	Shiawassee River	Lat 43°07'03", long 83°51'36", at sec.3/10, T.8 N., R.5 E., Genesee County, at bridge on Mt. Morris Road, 3.7 miles north of Flushing, MI.	--	--	03-23-82 03-24-82 03-25-82	3,670 3,380 3,260
Brent Creek	Flint River	Lat 43°07'32", long 83°52'29", in SE¼ NE¼ sec.4, T.8 N., R.5 E., Genesee County, at bridge on Seymour Road, 1.0 mile northeast of Brent Creek, MI.	--	--	03-23-82 03-24-82 03-25-82	17.0 16.8 14.9
Armstrong Creek	Flint River	Lat 43°09'33", long 83°51'48", in NE¼ sec.27, T.9 N., R.5 E., Genesee County, at bridge on McKinley Road, 1.5 miles southeast of Montrose, MI.	--	--	03-23-82 03-25-82	27.3 22.3
Flint River	Shiawassee River	Lat 43°10'34", long 83°52'41", in SE¼ SE¼ sec.16, T.9 N., R.5 E., Genesee County, at bridge on M-57, 0.25 mile east of Montrose, MI.	--	1959, 1978,1981	11-30-81 12-01-81 12-02-81 12-04-81 03-23-82 03-24-82 03-25-82	1,080 1,110 1,310 971 3,910 3,820 3,670
Brent Run	Flint River	Lat 43°11'13", long 83°51'48", in SE¼ NW¼ sec.15, T.9 N., R.5 E., Genesee County, at bridge on McKinley Road, 1.0 mile northeast of Montrose, MI.	--	1963, 1974, 1978,1981	11-30-81 12-02-81 03-23-82 03-24-82 03-25-82	18.7 21.3 55.6 53.8 47.5
Flint River	Shiawassee River	Lat 43°15'00", long 83°52'23", in SW¼ sec.22, T.10 N., R.5 E., Saginaw County, at bridge on Birch Run Road, 1.0 mile north of Morseville, MI.	--	--	12-02-81 03-23-82 03-24-82 03-25-82	1,350 4,430 4,060 3,770
Pine Run	Flint River	Lat 43°15'12", long 83°52'01", in NE¼ SW¼ sec.22, T.10 N., R.5 E., Saginaw County, at bridge on Morseville Road, 1.25 miles north of Morseville, MI.	--	1963, 1981	11-30-81 12-02-81 12-04-81	24.6 23.8 22.5
Silver Creek	Flint River	Lat 43°16'27", long 83°52'29", at sec.15/16, T.10 N., R.5 E., Saginaw County, at bridge on Pettit Road, 2.5 miles north of Morseville, MI.	--	--	12-02-81 12-04-81	22.0 17.5
do	do	Lat 43°16'39", long 83°53'08", in NE¼ NW¼ sec.16, T.10 N., R.5 E., Saginaw County, at bridge on Canada Road, 1.5 miles southeast of Fosters, MI.	--	1981	11-30-81	24.6
Cass River	Saginaw River	Lat 43°19'36", long 83°44'35", in sec.27, T.11 N., R.6 E., Saginaw County, upstream from the Wastewater Treatment Plant in Frankenmuth, MI.	--	--	08-24-82	*b65
do	do	Lat 43°19'39", long 83°44'47", in sec.27, T.11 N., R.6 E., Saginaw County, downstream from the Wastewater Treatment Plant in Frankenmuth, MI.	--	--	08-24-82	*b78

See footnotes at end of table.

DISCHARGE MEASUREMENTS AT MISCELLANEOUS SITES DURING WATER YEAR 1982--CONTINUED

Stream	Tributary to	Location	Drainage area (mi²)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft³/s)
		Streams tributary to Lake Huron--Continued				
Dead Creek	Cass River	Lat 43°19'18", long 83°47'38", in NW¼ sec.32, T.11 N., R.6 E., Saginaw County, at bridge on Curtis Road, 3.0 miles west of Frankenmuth, MI.	--	--	08-24-82	*b.70
Cass River	Saginaw River	Lat 43°19'23", long 83°47'52", in SE¼ SW¼ sec.30, T.11 N., R.6 E., Saginaw County, at bridge on Curtis Road, 3.5 miles west of Frankenmuth, MI.	--	--	08-24-82	*b60
Lingle Drain	Tittabawassee River	Lat 43°35'04", long 84°12'30", in SE¼ SE¼ sec.27, T.14 N., R.2 E., Midland County, 200 ft upstream from Tittabawassee River, 2.7 miles southwest of Midland, MI.	--	1974	08-31-82	*b5.91
Tittabawassee River	Saginaw River	Lat 43°33'52", long 84°11'14", in SW¼ NW¼ sec.1, T.13 N., R.2 E., Midland County, at bridge at Smiths Crossing, at Mapleton, MI.	--	1965-67, 1971,1974	08-31-82	*b3.94
		Streams tributary to St. Clair River				
North Branch Belle River	Belle River	Lat 43°01'09", long 83°06'24", at sec.24/19, T.7 N., R.11 E., Lapeer County, at bridge on Summers Road, 1.0 mile southwest of Imlay City, MI.	--	--	08-04-82 09-08-82	*b1.53 *b1.46
do	do	Lat 43°00'27", long 83°03'36", at sec.21/28, T.7 N., R.12 E., Lapeer County, at bridge on Newark Road, 1.0 mile southeast of Imlay City, MI.	--	--	08-04-82 09-08-82	*b3.28 *b2.69
Belle River	St. Clair River	Lat 43°59'17", long 83°04'05", in SE¼ NE¼ sec.32, T.7 N., R.12 E., Lapeer County, at bridge on M-53, 2.0 miles southeast of Imlay City, MI.	--	--	08-04-82 09-08-82	*b2.73 *b1.97
do	do	Lat 42°57'53", long 82°56'16", in SW¼ NE¼ sec.9, T.6 N., R.13 E., St. Clair County, at bridge on Capac Road, 2.5 miles southeast of Capac, MI.	92.7	1967	08-04-82 09-08-82	*b7.73 *b7.46
		Streams tributary to Lake Erie				
Haas Drain	Mill Creek	Lat 42°16'02", long 83°55'23", in NE¼ sec. 35, T.2 S., R.4 E., Washtenaw County, at bridge on Liberty Road, 2.5 miles southeast of Lima Center, MI.	9.7	1970-72, 1981	10-01-81 10-20-81 11-20-81 12-21-81 01-05-82 01-25-82 02-10-82 03-03-82 03-29-82 05-05-82	51.3 4.15 12.2 *1.56 9.86 *2.44 *3.02 *3.51 23.8 *2.90
Mill Creek	Huron River	Lat 42°16'53", long 83°55'22", in NE¼ sec. 26, T.2 S., R.4 E., Washtenaw County, at bridge on Jerusalem Road, 2.0 miles southeast of Lima Center, MI.	59.8	1970-72, 1980-81	10-01-81 10-20-81 11-20-81 12-21-81 01-05-82 01-25-82 02-10-82 03-03-82 03-29-82 05-05-82	354 36.1 53.8 *24.3 78.9 *25.4 *25.0 *29.0 107 *30.3
Letts Creek	North Fork Mill Creek	Lat 42°19'27", long 84°02'12", in SE¼ SE¼ sec.2, T.2 S., R.4 E., Washtenaw County, at bridge on Sibley Road, 0.1 mile east of Grabell Rd., 0.5 mile northeast of Chelsea, MI.	--	--	08-10-82	*b2.52
do	do	Lat 42°19'34", long 84°00'54", in SE¼ sec.1, T.2 S., R.4 E., Washtenaw County, at bridge on McKinley Road, 0.1 mile north of Chelsea, MI.	--	--	08-09-82	*b3.18
North Fork Mill Creek	Mill Creek	Lat 42°19'57", long 84°00'55", at sec.1/6, T.2 S., R.3 E., Washtenaw County, at bridge on McKinley Road, 0.5 miles north of Chelsea, MI.	14.6	1944-47, 1960-61, 1970	08-10-82	*b2.08

See footnotes at end of table.

DISCHARGE MEASUREMENTS AT MISCELLANEOUS SITES DURING WATER YEAR 1982--CONTINUED

Stream	Tributary to	Location	Drainage area (mi²)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft³/s)
		Streams tributary to Lake Erie--Continued				
North Fork Mill Creek	Mill Creek	Lat 42°19'19", long 83°58'45", in NE¼ sec.8, T.2 S., R.4 E., Washtenaw County, at bridge on Dexter-Chelsea Road, 1.5 miles east of Chelsea, MI.	--	1944-47, 1961,1976	08-10-82	*b7.7
do	do	Lat 42°17'57", long 83°57'41", in SE¼ sec.16, T.2 S., R.4 E., Washtenaw County, at bridge on old U.S. Highway 12, 3.0 miles southeast of Chelsea, MI.	--	--	08-10-82	*b7.70
do	do	Lat 42°17'16", long 83°56'12", at sec.22/23, T.2 S., R.4 E., Washtenaw County, at bridge on Duncer Road, 1.0 mile southeast of Lima, MI.	--	1970-72†, 1973-76d	08-10-82	*b10.7
Huron River	Lake Erie	Lat 42°05'38", long 83°17'42", in SE¼ SW¼ sec. 31, T.5 S., R.10 E., Wayne County, above the bridge at the city park in Flat Rock, MI.	866	1951,1961, 1970-71	07-14-82 09-03-82 09-14-82	b191 b222 *b154
Swan Creek	Lake Erie	Lat 42°02'27", long 83°19'35", in SE¼ sec.23, T.5 S., R.9 E., Monroe County, above confluence of Little Swan Creek, 2.0 miles southeast of South Rockwood, MI.	--	--	09-14-82	b0
Little Swan Creek	Swan Creek	Lat 42°02'26", long 83°19'36", in SE¼ sec.23, T.5 S., R.9 E., Monroe County, above confluence of Swan Creek, 2.0 miles southwest of South Rockwood, MI.	--	--	09-14-82	b0
River Raisin	Lake Erie	Lat 41°50'03", long 83°52'00", in SE¼ SE¼ sec. 30, T.7 S., R.5 E., Lenawee County, at bridge on U.S. 223, in Blissfield, MI.	--	--	03-16-82 03-16-82	b7,160 b6,810
Saline-Bridgewater Drain	Saline River	Lat 42°08'18", long 83°52'08", in NW¼ sec.17, T.4 S., R.5 E., Washtenaw County, 15 ft west of Feldcamp Road, 200 ft upstream of mouth, and 0.5 mile north of Benton, MI.	--	1981	10-10-81 11-20-81 12-21-81 01-05-82 01-25-82 02-10-82 03-03-82 03-29-82 05-06-82	*3.05 20.3 *2.13 16.5 *2.16 *1.94 *3.88 14.4 *2.54
Bauer Drain	do	Lat 42°09'38", long 83°51'01", in NW¼ sec.4, T.4 S., R.5 E., Washtenaw County, at bridge on Austin Road, 0.3 mile upstream of mouth, and 2.3 miles north of Benton, MI.	7.30	1970-72, 1981	10-01-81 10-20-81 11-20-81 12-21-81 01-05-82 01-25-82 02-10-82 03-03-82 03-29-82 05-06-82	83.8 2.45 26.7 *1.58 18.6 *1.83 *1.49 3.78 18.6 *2.29
Saline River	River Raisin	Lat 42°10'15", long 83°49'32", in NE¼ SW¼ sec.34, T.3 S., R.5 E., Washtenaw County, at bridge on Dell Road, 1.5 miles west of Saline, MI.	44.3	1964, 1980-81	10-01-81 10-20-81 11-20-81 12-22-81 01-05-82 01-25-82 02-10-82 03-03-82 03-29-82 05-06-82	469 22.5 127 *19.2 80.5 *15.1 *13.2 38.6 88.4 *18.8
Wanty Drain	Saline River	Lat 42°02'23", long 83°37'40", in NW¼ sec.20, T.5 S., R.7 E., Monroe County, at bridge at Plank Road, 2.4 miles northeast of Azalia, MI.	--	1981	10-01-81 10-21-81 11-23-81 12-22-81 01-06-82 01-26-82 02-12-82 03-24-82 03-30-82 05-03-82	34.1 1.30 4.46 *0.62 7.97 *0.96 *1.27 *1.70 5.64 *0.74

See footnotes at end of table.

DISCHARGE MEASUREMENTS AT MISCELLANEOUS SITES DURING WATER YEAR 1982--CONTINUED

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
		Streams tributary to Lake Erie--Continued				
Bear Creek	Saline River	Lat 42°01'37", long 87°38'08", in SW¼ sec.20, T.5 S., R.7 E., Monroe County, at bridge on Bunce Road, 1.1 miles west of London, MI.	--	1981	10-01-81	33.8
					10-21-81	1.33
					11-23-81	3.53
					12-22-81	*0.64
					01-06-82	7.73
					01-26-82	*0.51
					02-12-82	*0.59
					03-30-82	6.31
					05-03-82	*0.60
Saline River	River Raisin	Lat 41°58'59", long 83°36'59", in NE¼ sec.8, T.6 S., R.7 E., Monroe County, at bridge on Bigelow Road, 0.6 mile upstream from mouth, and 3.0 miles east of Dundee, MI.	--	1981	10-01-81	494
					10-21-81	69.5
					11-23-81	194
					01-26-82	*44.2
					02-11-82	*44.6
					03-04-82	72.3
					03-30-82	241
					05-03-82	*66.8
Prouty Drain	West Fork West Branch St. Joseph River	Lat 41°48'10", long 84°44'52", at sec.2/3, T.8 S., R.4 W., Hillsdale County, at bridge on M-49, 2.5 miles south of Reading, MI.	--	--	11-17-81	*b3.45
do	do	Lat 41°47'42", long 84°46'02", at sec.9/10, T.8 S., R.4 W., Hillsdale County, at bridge or Abbot Road, 3.0 miles southwest of Reading, MI.	--	--	11-17-81	*b3.66
do	do	Lat 41°47'52", long 84°46'56", in SW¼ sec.4, T.8 S., R.4 W., Hillsdale County, at bridge on Brott Road, 3.5 miles southwest of Reading, MI.	--	--	11-17-81	*b4.14
Horseshoe Lake Outlet	Bean Creek	Lat 41°54'22", long 84°21'29", in SE¼ NW¼ sec. 31, T.6 S., R.1 E., Lenawee County, at bridge on Hillside Road, 1.5 miles west of Rollin, MI.	--	--	09-14-82	b0

* Base flow.
† Operated as a low-flow partial-record station.
‡ Operated as a continuous-record gaging station.
a Approximately.
b Discharge measurement made by employees of Michigan Department of Natural Resources.
c Flow is leakage from dam.
d Operated as a crest-stage partial-record station.

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Water-quality partial-record stations are particular sites where chemical-quality, biological and/or sediment data are collected systematically over a period of years for use in hydrologic analyses. The data are collected usually less than quarterly. The following partial-record stations are located in Van Buren County. Data collected at these stations during the course of the Van Buren County study are shown in the following tables.

STREAMS TRIBUTARY TO LAKE MICHIGAN

WATER QUALITY DATA, WATER YEARS OCTOBER 1979 TO SEPTEMBER 1982

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)
04101715 - OSBORNE DRAIN AT KEELER, MI (LAT 42 04 20 LONG 086 05 20)									
APR , 1980									
24...	1235	10	382	--	9.0	--	--	--	--
MAY									
19...	0930	11	327	--	12.0	--	--	--	--
OCT									
15...	1340	5.4	320	--	11.0	--	--	--	2.3
MAY , 1981									
12...	0835	29	210	6.8	6.5	9.2	78	--	.56
JUL									
06...	1620	6.1	380	7.2	20.0	7.1	79	--	1.9
OCT									
28...	1420	4.9	385	7.7	9.5	8.8	76	3.0	2.4
MAY , 1982									
11...	1545	7.9	361	7.9	20.0	7.6	84	--	1.8
AUG									
10...	1455	6.8	344	8.4	17.0	6.8	72	--	--
04102140 - EAGLE LAKE DRAIN NEAR LAWTON, MI (LAT 42 10 18 LONG 085 55 00)									
APR , 1980									
23...	1450	19	512	--	14.0	--	--	--	--
24...	1930	22	484	--	7.5	--	--	--	--
OCT									
14...	1240	16	320	--	11.0	--	--	--	1.3
MAY , 1981									
12...	1025	39	390	7.5	9.0	9.0	76	--	1.6
JUL									
07...	1100	16	500	7.7	14.0	7.8	76	--	1.3
OCT									
27...	1425	14	500	7.8	12.0	10.2	94	1.8	1.5
MAY , 1982									
12...	1445	17	473	7.5	16.0	11.5	117	--	1.3
AUG									
11...	1030	15	486	7.8	11.0	8.0	73	--	--
04102143 - GATES DRAIN AT LAWTON, MI (LAT 42 10 18 LONG 085 54 30)									
APR , 1980									
24...	1900	73	585	--	7.5	--	--	--	--
OCT									
14...	1340	45	460	--	10.0	--	--	--	1.3
MAY , 1981									
12...	1135	131	574	7.3	8.5	9.6	81	--	1.6
JUL									
07...	1130	42	600	7.9	16.5	9.4	97	--	1.2
OCT									
27...	1300	53	620	7.7	10.5	8.6	77	2.2	1.5
MAY , 1982									
12...	1600	51	684	7.8	19.0	9.4	102	--	1.3
AUG									
11...	1140	44	580	8.0	12.0	9.2	87	--	--
04102165 - EAST BRANCH PAW PAW RIVER NEAR MATTAWAN, MI (LAT 42 40 30 LONG 085 47 22)									
APR , 1980									
23...	1245	8.9	407	--	16.0	--	--	--	--
OCT									
14...	0900	8.4	466	--	7.0	--	--	--	.25
MAY , 1981									
11...	1530	35	320	7.7	9.0	9.2	79	--	--
JUL									
06...	1145	5.5	420	7.8	24.5	6.8	80	--	3.1
OCT									
27...	1230	8.4	430	7.9	11.0	10.1	92	.61	.36
MAY , 1982									
11...	1130	7.2	440	8.2	19.0	8.9	96	--	.32
AUG									
10...	0845	6.8	420	8.7	18.5	6.3	66	--	--

STREAMS TRIBUTARY TO LAKE MICHIGAN

WATER-QUALITY DATA

DATE	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N)
04100715 — OSBORNE DRAIN AT KEELER, MI (LAT 42 04 20 LONG 086 05 20)									
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
MAY									
19...	--	--	--	--	--	--	--	--	--
OCT									
15...	--	.020	--	2.3	--	.020	--	.31	--
MAY , 1981									
12...	--	<.010	--	.56	--	.060	--	.78	--
JUL									
06...	--	.020	--	1.9	--	.010	--	.62	--
OCT									
28...	2.40	.020	.020	2.4	2.4	.010	.010	.70	.61
MAY , 1982									
11...	--	.030	--	1.8	--	.070	--	1.1	--
AUG									
10...	--	--	--	--	--	--	--	--	--
04102140 — EAGLE LAKE DRAIN NEAR LAWTON, MI (LAT 42 10 18 LONG 085 55 00)									
APR , 1980									
23...	--	--	--	--	--	--	--	--	--
24...	--	--	--	--	--	--	--	--	--
OCT									
14...	--	.020	--	1.3	--	.070	--	.26	--
MAY , 1981									
12...	--	.020	--	1.6	--	.140	--	.72	--
JUL									
07...	--	.030	--	1.3	--	.010	--	.36	--
OCT									
27...	1.40	.030	.020	1.5	1.4	.060	.050	.33	.36
MAY , 1982									
12...	--	.030	--	1.3	--	.040	--	1.2	--
AUG									
11...	--	--	--	--	--	--	--	--	--
04102143 — GATES DRAIN AT LAWTON, MI (LAT 42 10 18 LONG 085 54 30)									
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
OCT									
14...	--	.020	--	1.3	--	.060	--	.37	--
MAY , 1981									
12...	--	.020	--	1.6	--	.130	--	1.1	--
JUL									
07...	--	.020	--	1.2	--	.020	--	.41	--
OCT									
27...	1.50	.030	.020	1.5	1.5	.090	.090	.95	.60
MAY , 1982									
12...	--	.030	--	1.3	--	.060	--	.76	--
AUG									
11...	--	--	--	--	--	--	--	--	--
04102165 — EAST BRANCH PAW PAW RIVER NEAR MATTAWAN, MI (LAT 42 40 30 LONG 085 47 22)									
APR , 1980									
23...	--	--	--	--	--	--	--	--	--
OCT									
14...	--	.000	--	.25	--	.040	--	.34	--
MAY , 1981									
11...	--	--	--	--	--	--	--	--	--
JUL									
06...	--	.020	--	3.1	--	.020	--	.60	--
OCT									
27...	.35	<.010	<.010	.36	.35	.030	.020	.27	.24
MAY , 1982									
11...	--	.010	--	.33	--	.030	--	.89	--
AUG									
10...	--	--	--	--	--	--	--	--	--

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DIS-SOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDIMENT, SUS-PENDED (MG/L)	SEDIMENT, DIS-CHARGE, SUS-PENDED (T/DAY)
04101715 — OSBORNE DRAIN AT KEELER, MI (LAT 42 04 20 LONG 086 05 20)									
APR 1980									
24...	--	--	--	--	--	--	--	--	--
MAY									
19...	--	--	--	--	--	--	--	6	--
OCT									
15...	.33	--	2.6	.020	--	.000	--	1	.01
MAY 1981									
12...	.84	--	1.4	.010	--	.010	--	8	.63
JUL									
06...	.63	--	2.5	.030	--	<.010	--	4	.07
OCT									
28...	.71	.62	3.1	<.010	<.010	<.010	<.010	0	.00
MAY 1982									
11...	1.20	--	3.0	.030	--	.010	--	7	.15
AUG									
10...	--	--	--	--	--	--	--	6	.11
04102140 — EAGLE LAKE DRAIN NEAR LAWTON, MI (LAT 42 10 18 LONG 085 55 00)									
APR 1980									
23...	--	--	--	--	--	--	--	7	.36
24...	--	--	--	--	--	--	--	5	.30
OCT									
14...	.33	--	1.6	.020	--	.000	--	19	.82
MAY 1981									
12...	.86	--	2.5	.020	--	<.010	--	5	.53
JUL									
07...	.37	--	1.7	.020	--	<.010	--	10	.43
OCT									
27...	.39	.41	1.9	.010	<.010	<.010	<.010	--	--
MAY 1982									
12...	1.20	--	2.5	.020	--	<.010	--	15	.69
AUG									
11...	--	--	--	--	--	--	--	16	.65
04102143 — GAILES DRAIN AT LAWTON, MI (LAT 42 10 18 LONG 085 54 30)									
APR 1980									
24...	--	--	--	--	--	--	--	18	3.5
OCT									
14...	.43	--	1.7	.030	--	.000	--	19	2.3
MAY 1981									
12...	1.20	--	2.8	.050	--	<.010	--	13	4.4
JUL									
07...	.43	--	1.6	.010	--	<.010	--	16	1.8
OCT									
27...	.64	.69	2.1	.020	<.010	.020	<.010	28	4.0
MAY 1982									
12...	.82	--	2.1	.030	--	.010	--	12	1.7
AUG									
11...	--	--	--	--	--	--	--	15	1.8
04102165 — EAST BRANCH PAW PAW RIVER NEAR WATTAWAN, MI (LAT 42 40 30 LONG 085 47 22)									
APR 1980									
23...	--	--	--	--	--	--	--	3	.07
OCT									
14...	.38	--	.63	.020	--	.000	--	3	.07
MAY 1981									
11...	--	--	--	--	--	--	--	2	.19
JUL									
06...	.62	--	3.7	.040	--	.080	--	11	.16
OCT									
27...	.30	.26	.66	<.010	<.010	<.010	<.010	5	.11
MAY 1982									
11...	.62	--	.95	.020	--	<.010	--	10	.19
AUG									
10...	--	--	--	--	--	--	--	11	.20

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)
04102177 - COOK DRAIN AT MATTAWAN, MI (LAT 42 42 30 LONG 085 49 25)									
APR, 1980									
23...	1600	2.0	353	--	17.0	--	--	--	--
OCT									
14...	1245	1.0	431	--	7.5	--	--	--	.20
MAY, 1981									
11...	1800	31	180	7.3	8.0	10.3	97	--	.06
JUL									
06...	1305	.70	400	7.9	23.0	8.1	93	--	.15
OCT									
27...	1345	1.6	380	7.8	10.0	9.9	88	.37	.15
MAY, 1982									
11...	1245	1.8	385	8.3	20.0	9.1	99	--	--
AUG									
10...	1000	.94	390	8.2	17.0	8.3	85	--	--
04102240 - BRANDYWINE CREEK NEAR GOBLES, MI (LAT 42 18 53 LONG 085 54 30)									
APR, 1980									
24...	1500	6.6	150	--	9.0	--	--	--	--
OCT									
14...	1240	2.7	193	--	8.5	--	--	--	1.2
MAY, 1981									
11...	1530	31	134	7.6	8.0	--	--	--	.94
JUL									
06...	1200	1.7	300	7.9	19.0	7.6	92	--	1.3
OCT									
27...	1215	2.8	203	6.9	10.0	9.4	85	1.6	.91
MAY, 1982									
11...	1130	2.2	262	8.1	17.0	9.2	96	--	1.2
AUG									
10...	1710	1.3	265	8.0	18.5	8.3	86	--	--
04102246 - NORTH EXTENSION DRAIN NEAR GOBLES, MI (LAT 42 19 01 LONG 085 55 10)									
APR, 1980									
24...	1550	8.1	242	--	9.5	--	--	--	--
OCT									
14...	1340	2.7	289	--	8.5	--	--	--	.33
MAY, 1981									
12...	1445	48	211	7.3	13.0	--	--	--	.42
JUL									
06...	1315	1.0	360	7.4	20.0	6.6	80	--	.52
OCT									
27...	1340	4.5	365	8.5	10.0	8.1	73	2.7	1.0
MAY, 1982									
11...	1300	2.1	332	8.2	18.0	11.8	126	--	.48
AUG									
10...	1815	.48	350	8.1	19.0	7.8	--	--	--
04102350 - BRUSH CREEK NEAR LAWRENCE, MI (LAT 42 09 24 LONG 086 03 20)									
APR, 1980									
23...	1635	19	354	--	16.0	--	--	--	--
MAY									
21...	1245	15	323	--	14.0	--	--	--	--
OCT									
15...	1745	11	379	--	10.5	--	--	--	1.2
MAY, 1981									
12...	1530	36	243	7.6	12.0	11.2	--	--	.98
JUL									
08...	1230	10	350	8.0	19.0	8.4	88	--	1.3
OCT									
28...	1635	11	360	7.8	9.0	10.5	90	2.4	1.3
MAY, 1982									
12...	0930	13	352	7.7	15.0	9.2	92	--	1.3
AUG									
10...	1630	9.9	366	8.6	16.0	8.6	91	--	--

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA

DATE	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N)
04102177 - COOK DRAIN AT MATTAWAN, MI (LAT 42 42 30 LONG 085 49 25)									
APR , 1980									
23...	--	--	--	--	--	--	--	--	--
OCT									
14...	--	.080	--	.28	--	.030	--	.32	--
MAY , 1981									
11...	--	<.010	--	.06	--	.010	--	.74	--
JUL									
06...	--	<.010	--	.15	--	.050	--	.38	--
OCT									
27...	.13	<.010	<.010	.15	.13	<.010	<.010	.29	.24
MAY , 1982									
11...	--	.010	--	<.10	--	.020	--	.84	--
AUG									
10...	--	--	--	--	--	--	--	--	--
04102240 - BRANDYWINE CREEK NEAR GOBLES, MI (LAT 42 18 53 LONG 085 54 30)									
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
OCT									
14...	--	.010	--	1.2	--	.060	--	.56	--
MAY , 1981									
11...	--	.020	--	.96	--	.110	--	1.5	--
JUL									
06...	--	.010	--	1.3	--	<.010	--	.57	--
OCT									
27...	.88	<.010	<.010	.91	.88	.020	.020	.78	.70
MAY , 1982									
11...	--	.010	--	1.2	--	.040	--	1.3	--
AUG									
10...	--	--	--	--	--	--	--	--	--
04102246 - NORTH EXTENSION DRAIN NEAR GOBLES, MI (LAT 42 19 01 LONG 085 55 10)									
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
OCT									
14...	--	.020	--	.35	--	.120	--	.45	--
MAY , 1981									
12...	--	.010	--	.43	--	.070	--	.76	--
JUL									
06...	--	.050	--	.57	--	.030	--	.61	--
OCT									
27...	1.00	.060	.050	1.1	1.1	.080	.050	.92	.75
MAY , 1982									
11...	--	.020	--	.50	--	.050	--	1.1	--
AUG									
10...	--	--	--	--	--	--	--	--	--
04102350 - BRUSH CREEK NEAR LAWRENCE, MI (LAT 42 09 24 LONG 086 03 20)									
APR , 1980									
23...	--	--	--	--	--	--	--	--	--
MAY									
21...	--	--	--	--	--	--	--	--	--
OCT									
15...	--	.010	--	1.2	--	.070	--	.23	--
MAY , 1981									
12...	--	.020	--	1.0	--	.050	--	.69	--
JUL									
08...	--	.010	--	1.3	--	.010	--	.50	--
OCT									
28...	1.30	.010	.010	1.3	1.3	.030	.020	.29	1.1
MAY , 1982									
12...	--	.020	--	1.3	--	.050	--	.59	--
AUG									
10...	--	--	--	--	--	--	--	--	--

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN,AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN,AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DIS-SOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDIMENT, SUS-PENDED (MG/L)	SEDIMENT, DIS-CHARGE, SUS-PENDED (T/DAY)
04102177 - COOK DRAIN AT MATTAWAN, MI (LAT 42 42 30 LONG 085 49 25)									
APR , 1980									
23...	--	--	--	--	--	--	--	4	.02
OCT									
14...	.35	--	.55	.020	--	.000	--	1	.00
MAY , 1981									
11...	.75	--	.81	.020	--	<.010	--	114	9.5
JUL									
06...	.43	--	.58	<.010	--	<.010	--	3	.01
OCT									
27...	.29	.24	.44	<.010	<.010	<.010	<.010	1	.00
MAY , 1982									
11...	.06	--	--	.030	--	.010	--	3	.01
AUG									
10...	--	--	--	--	--	--	--	1	.00
04102240 - BRANDYWINE CREEK NEAR GORLES, MI (LAT 42 18 53 LONG 085 54 30)									
APR , 1980									
24...	--	--	--	--	--	--	--	9	.16
OCT									
14...	.62	--	1.8	.030	--	.000	--	5	.04
MAY , 1981									
11...	1.60	--	2.6	.080	--	.040	--	12	1.0
JUL									
06...	.57	--	1.9	.050	--	<.010	--	75	.34
OCT									
27...	.88	.72	1.7	.030	.010	<.010	<.010	6	.05
MAY , 1982									
11...	1.30	--	2.5	.040	--	.020	--	13	.08
AUG									
10...	--	--	--	--	--	--	--	10	.04
04102246 - NORTH EXTENSION DRAIN NEAR GORLES, MI (LAT 42 19 01 LONG 085 55 10)									
APR , 1980									
24...	--	--	--	--	--	--	--	9	.20
OCT									
14...	.57	--	.92	.060	--	.030	--	5	.04
MAY , 1981									
12...	.83	--	1.3	.110	--	.030	--	32	4.1
JUL									
06...	.64	--	1.2	.090	--	.080	--	13	.04
OCT									
27...	1.80	1.6	2.9	.100	.050	.050	.030	3	.04
MAY , 1982									
11...	1.10	--	1.6	.070	--	.040	--	12	.07
AUG									
10...	--	--	--	--	--	--	--	5	.01
04102350 - BRUSH CREEK NEAR LAWRENCE, MI (LAT 42 09 24 LONG 085 03 20)									
APR , 1980									
23...	--	--	--	--	--	--	--	22	1.1
MAY									
21...	--	--	--	--	--	--	--	23	.93
OCT									
15...	.30	--	1.5	.030	--	.010	--	3	.09
MAY , 1981									
12...	.74	--	1.7	.060	--	<.010	--	33	3.2
JUL									
08...	.51	--	1.8	<.010	--	<.010	--	13	.35
OCT									
28...	.32	1.1	1.6	.010	<.010	.020	<.010	3	.09
MAY , 1982									
12...	.64	--	1.9	.040	--	.020	--	17	.60
AUG									
10...	--	--	--	--	--	--	--	12	.32

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)
04102362 - RED CREEK NEAR LAWRENCE, MI (LAT 42 10 10 LONG 086 04 15)									
APR , 1980									
24...	1125	4.3	421	--	7.0	--	--	--	--
OCT									
15...	0930	1.8	420	--	9.0	--	--	--	1.1
MAY , 1981									
13...	0830	20	182	7.2	8.0	10.6	93	--	.47
JUL									
08...	1330	1.2	460	8.0	21.0	8.3	90	--	1.7
OCT									
29...	1135	2.4	420	7.7	9.0	9.1	78	1.4	.87
MAY , 1982									
12...	1045	2.2	421	8.0	16.0	10.2	104	--	1.1
AUG									
11...	1145	2.1	370	7.9	16.0	8.6	85	--	--
04102429 - PINE CREEK AT HARTFORD, MI (LAT 42 12 20 LONG 086 10 55)									
APR , 1980									
23...	1230	6.9	535	--	13.5	--	--	--	--
OCT									
14...	1515	4.4	562	--	9.5	--	--	--	1.3
MAY , 1981									
13...	1330	17	440	7.6	11.0	9.8	87	--	2.2
JUL									
08...	1715	3.7	530	8.0	21.5	7.3	80	--	.87
OCT									
29...	1255	5.7	550	8.1	10.5	12.6	110	1.6	1.2
MAY , 1982									
12...	1330	4.7	510	8.7	18.0	11.2	119	--	1.1
AUG									
11...	1000	4.7	565	7.5	14.0	8.6	85	--	--
04102587 - HAVEN-MAX LK DR AT 45 ST NR BLOOMINGDALE, MICH. (LAT 42 22 25 LONG 085 59 11)									
APR , 1980									
23...	1600	12	375	--	16.0	--	--	--	--
OCT									
14...	1620	5.3	858	--	9.0	--	--	--	.14
MAY , 1981									
12...	1330	81	292	7.4	16.0	--	--	--	.41
JUL									
07...	1430	3.2	495	8.0	19.0	8.0	96	--	.27
OCT									
28...	1200	5.8	577	8.0	7.0	10.2	85	1.4	.54
MAY , 1982									
12...	1500	4.4	468	8.4	20.5	10.6	119	--	.13
AUG									
11...	0945	2.7	390	8.4	14.5	8.9	89	--	--
04102589 - HAVEN-MAX LK DR AT 46.5 ST NR BLOOMINGDALE, MICH (LAT 42 22 08 LONG 086 00 01)									
APR , 1980									
23...	1715	16	375	--	13.0	--	--	--	--
OCT									
15...	1040	8.6	926	--	10.5	--	--	--	.04
MAY , 1981									
11...	2100	147	403	7.5	11.0	--	--	--	.33
JUL									
07...	1320	4.5	376	8.5	26.5	8.6	104	--	.01
OCT									
28...	1045	8.8	400	7.9	10.0	7.9	71	.61	.08
MAY , 1982									
12...	1330	6.4	362	8.9	22.5	10.7	124	--	--
AUG									
10...	1600	3.5	332	8.9	26.0	8.8	109	--	--

WATER-QUALITY DATA

DATE	NITROGEN, NITRATE DISSOLVED (MG/L AS N)	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NITRITE DISSOLVED (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N)
04102362 - RED CREEK NEAR LAWRENCE, MI (LAT 42 10 10 LONG 086 04 15)									
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
OCT									
15...	--	.010	--	1.1	--	.060	--	.36	--
MAY , 1981									
13...	--	.010	--	.48	--	.040	--	1.3	--
JUL									
08...	--	.020	--	1.7	--	.010	--	.54	--
OCT									
29...	.86	<.010	<.010	.87	.86	.020	.010	.56	.51
MAY , 1982									
12...	--	.040	--	1.1	--	.040	--	.96	--
AUG									
11...	--	--	--	--	--	--	--	--	--
04102429 - PINE CREEK AT HARTFORD, MI (LAT 42 12 20 LONG 086 10 55)									
APR , 1980									
23...	--	--	--	--	--	--	--	--	--
OCT									
14...	--	.030	--	1.3	--	.020	--	.28	--
MAY , 1981									
13...	--	.020	--	2.2	--	.080	--	.80	--
JUL									
08...	--	.020	--	.89	--	.040	--	.66	--
OCT									
29...	1.20	.010	<.010	1.2	1.2	.010	.010	.37	.39
MAY , 1982									
12...	--	.050	--	1.1	--	.050	--	.52	--
AUG									
11...	--	--	--	--	--	--	--	--	--
04102587 - HAVEN-MAX LK DR AT 45 ST NR BLOOMINGDALE, MICH. (LAT 42 22 25 LONG 085 59 11)									
APR , 1980									
23...	--	--	--	.10	--	--	--	--	--
OCT									
14...	--	.010	--	.15	--	.060	--	.53	--
MAY , 1981									
12...	--	.030	--	.44	--	.060	--	.90	--
JUL									
07...	--	.020	--	.29	--	<.010	--	.57	--
OCT									
28...	.56	.030	.030	.57	.59	.130	.130	.58	.66
MAY , 1982									
12...	--	.020	--	.15	--	.050	--	1.1	--
AUG									
11...	--	--	--	--	--	--	--	--	--
04102589 - HAVEN-MAX LK DR AT 46.5 ST NR BLOOMINGDALE, MICH (LAT 42 22 08 LONG 086 00 01)									
APR , 1980									
23...	--	--	--	.00	--	--	--	--	--
OCT									
15...	--	.000	--	.04	--	.020	--	.52	--
MAY , 1981									
11...	--	.010	--	.34	--	.060	--	.66	--
JUL									
07...	--	<.010	--	.01	--	<.010	--	.55	--
OCT									
28...	.06	<.010	.010	.08	.07	.220	.200	.69	.34
MAY , 1982									
12...	--	.020	--	<.10	--	.030	--	1.3	--
AUG									
10...	--	--	--	--	--	--	--	--	--

WATER-QUALITY DATA

DATE	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
04102362 - RED CREEK NEAR LAWRENCE, MI (LAT 42 10 10 LONG 086 04 15)									
APR, 1980									
24...	--	--	--	--	--	--	--	8	.09
OCT									
15...	.42	--	1.5	.030	--	.030	--	3	.01
MAY, 1981									
13...	1.30	--	1.8	.060	--	.030	--	60	3.2
JUL									
08...	.55	--	2.3	<.010	--	.010	--	4	.01
OCT									
29...	.58	.52	1.5	.030	.020	.010	<.010	3	.02
MAY, 1982									
12...	1.00	--	2.1	.060	--	.030	--	4	.02
AUG									
11...	--	--	--	--	--	--	--	4	.02
04102429 - PINE CREEK AT HARTFORD, MI (LAT 42 12 20 LONG 086 10 55)									
APR, 1980									
23...	--	--	--	--	--	--	--	7	.13
OCT									
14...	.30	--	1.6	.030	--	.000	--	14	.17
MAY, 1981									
13...	.88	--	3.1	.070	--	.020	--	16	.73
JUL									
08...	.70	--	1.6	<.010	--	<.010	--	46	.46
OCT									
29...	.38	.40	1.6	.020	.010	.010	<.010	6	.09
MAY, 1982									
12...	.57	--	1.7	.040	--	.020	--	14	.18
AUG									
11...	--	--	--	--	--	--	--	14	.18
04102587 - HAVEN-MAX LK DR AT 45 ST NR BLOOMINGDALE, MICH. (LAT 42 22 25 LONG 085 59 11)									
APR, 1980									
23...	--	--	--	--	--	--	--	9	.29
OCT									
14...	.59	--	.74	.070	--	.020	--	9	.13
MAY, 1981									
12...	.96	--	1.4	.080	--	.020	--	43	9.4
JUL									
07...	.57	--	.86	.050	--	.030	--	9	.08
OCT									
28...	.71	.79	1.3	.060	.020	.030	<.010	3	.05
MAY, 1982									
12...	1.10	--	1.3	.050	--	.030	--	3	.04
AUG									
11...	--	--	--	--	--	--	--	12	.09
04102589 - HAVEN-MAX LK DR AT 46.5 ST NR BLOOMINGDALE, MICH (LAT 42 22 08 LONG 086 00 01)									
APR, 1980									
23...	--	--	--	--	--	--	--	5	.22
OCT									
15...	.54	--	.58	.020	--	.000	--	2	.05
MAY, 1981									
11...	.72	--	1.1	.030	--	<.010	--	11	4.4
JUL									
07...	.55	--	.56	.020	--	<.010	--	5	.06
OCT									
28...	.91	.54	.99	.040	.030	.020	.010	5	.12
MAY, 1982									
12...	1.30	--	--	.020	--	<.010	--	1	.02
AUG									
10...	--	--	--	--	--	--	--	5	.05

WATER-QUALITY DATA

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)
04102735 - MIDDLE BRANCH BLACK RIVER NEAR BLOOMINGDALE, MI (LAT 42 25 09 LONG 086 02 25)									
APR, 1980									
23...	1400	7.8	285	--	16.5	--	--	--	--
OCT									
15...	1230	4.2	271	--	9.0	--	--	--	.05
MAY, 1981									
12...	1200	45	191	7.2	9.0	--	--	--	.01
JUL									
07...	1115	2.3	308	7.6	21.0	7.0	84	--	.16
OCT									
28...	1445	4.4	296	7.7	8.0	9.1	77	.88	.09
MAY, 1982									
12...	1100	2.5	370	8.0	19.5	8.8	97	--	.13
AUG									
11...	1300	2.4	320	8.0	18.5	7.2	78	--	--
04102750 - MELVIN CREEK NEAR BLOOMINGDALE, MI (LAT 42 24 33 LONG 086 00 35)									
APR, 1980									
24...	1200	6.6	655	--	8.0	--	--	--	--
OCT									
15...	1120	6.4	733	--	8.0	--	--	--	.26
MAY, 1981									
13...	1340	29	345	7.3	10.0	10.0	88	--	.17
JUL									
07...	1220	2.8	750	8.0	17.0	8.2	99	--	.34
OCT									
28...	1340	4.7	760	8.1	8.0	9.8	83	--	.15
MAY, 1982									
12...	1200	3.7	720	8.2	17.5	10.2	107	--	.05
AUG									
11...	1100	2.3	666	8.2	14.0	8.6	85	--	--
04102770 - BARBER CREEK NEAR GRAND JUNCTION, MI (LAT 42 25 09 LONG 086 03 40)									
APR, 1980									
23...	1230	12	260	--	13.5	--	--	--	--
OCT									
15...	1340	9.5	247	--	9.0	--	--	--	.14
MAY, 1981									
12...	1100	41	167	7.1	8.0	--	--	--	.11
JUL									
07...	1000	5.6	283	7.3	16.5	7.8	94	--	.20
OCT									
28...	1550	7.1	279	7.6	9.0	8.6	75	.65	.13
MAY, 1982									
12...	0930	6.6	294	7.9	15.0	7.9	79	--	.15
AUG									
11...	1145	6.4	268	8.0	16.0	7.7	79	--	--
04107740 - PINE CREEK NEAR GOBLES, MI (LAT 42 24 40 LONG 085 46 15)									
APR, 1980									
24...	1320	40	515	--	8.0	--	--	--	--
MAY									
22...	1400	38	552	--	14.0	--	--	--	--
OCT									
15...	1920	35	544	--	10.5	--	--	--	.49
MAY, 1981									
11...	1830	222	395	7.5	8.0	--	--	--	2.1
JUL									
08...	1015	27	580	7.8	17.5	8.4	86	--	.47
OCT									
27...	1530	41	542	8.0	11.0	8.8	81	1.1	.67
MAY, 1982									
12...	0900	31	520	8.2	15.5	8.1	80	--	.70
AUG									
11...	1430	35	531	8.8	14.0	9.5	94	--	--

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN, NITRATE DISSOLVED (MG/L AS N)	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NITRITE DISSOLVED (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N)
04102735 - MIDDLE BRANCH BLACK RIVER NEAR BLOOMINGDALE, MI (LAT 42 25 09 LONG 086 02 25)									
APR, 1980									
23...	--	--	--	--	--	--	--	--	--
OCT									
15...	--	.010	--	.06	--	.040	--	.55	--
MAY, 1981									
12...	--	.010	--	.02	--	.030	--	.53	--
JUL									
07...	--	<.010	--	.16	--	<.010	--	.49	--
OCT									
28...	.07	<.010	<.010	.09	.07	.080	.050	.62	.76
MAY, 1982									
12...	--	.010	--	.14	--	.050	--	.73	--
AUG									
11...	--	--	--	--	--	--	--	--	--
04102750 - MELVIN CREEK NEAR BLOOMINGDALE, MI (LAT 42 24 33 LONG 086 00 35)									
APR, 1980									
24...	--	--	--	--	--	--	--	--	--
OCT									
15...	--	.000	--	.26	--	.020	--	.37	--
MAY, 1981									
13...	--	<.010	--	.17	--	.060	--	.73	--
JUL									
07...	--	.020	--	.36	--	.010	--	.33	--
OCT									
28...	--	<.010	--	.15	--	.050	--	.54	--
MAY, 1982									
12...	--	.040	--	<.10	--	.030	--	1.1	--
AUG									
11...	--	--	--	--	--	--	--	--	--
04102770 - BARBER CREEK NEAR GRAND JUNCTION, MI (LAT 42 25 09 LONG 086 03 40)									
APR, 1980									
23...	--	--	--	--	--	--	--	--	--
OCT									
15...	--	.010	--	.15	--	.050	--	.45	--
MAY, 1981									
12...	--	<.010	--	.11	--	.320	--	.50	--
JUL									
07...	--	<.010	--	.20	--	.030	--	.58	--
OCT									
28...	.12	<.010	<.010	.13	.12	.060	.060	.32	.47
MAY, 1982									
12...	--	.040	--	.19	--	.080	--	1.1	--
AUG									
11...	--	--	--	--	--	--	--	--	--
04107740 - PINE CREEK NEAR GOBLES, MI (LAT 42 24 40 LONG 085 46 15)									
APR, 1980									
24...	--	--	--	--	--	--	--	--	--
MAY									
22...	--	--	--	--	--	--	--	--	--
OCT									
15...	--	.010	--	.50	--	.040	--	.15	--
MAY, 1981									
11...	--	.020	--	2.1	--	.140	--	.96	--
JUL									
08...	--	.020	--	.49	--	.030	--	.41	--
OCT									
27...	.67	.010	.020	.68	.69	.070	.060	.28	.38
MAY, 1982									
12...	--	.020	--	.72	--	.060	--	.44	--
AUG									
11...	--	--	--	--	--	--	--	--	--

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA

DATE	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
04102735 - MIDDLE BRANCH BLACK RIVER NEAR BLOOMINGDALE, MI (LAT 42 25 09 LONG 086 02 25)									
APR , 1980									
23...	--	--	--	--	--	--	--	2	.04
OCT									
15...	.59	--	.65	.020	--	.000	--	2	.02
MAY , 1981									
12...	.56	--	.58	.030	--	<.010	--	2	.24
JUL									
07...	.49	--	.65	.040	--	.020	--	3	.02
OCT									
28...	.70	.81	.79	.020	.010	<.010	<.010	1	.01
MAY , 1982									
12...	.78	--	.92	.050	--	.020	--	6	.04
AUG									
11...	--	--	--	--	--	--	--	7	.05
04102750 - MELVIN CREEK NEAR BLOOMINGDALE, MI (LAT 42 24 33 LONG 086 00 35)									
APR , 1980									
24...	--	--	--	--	--	--	--	3	.05
OCT									
15...	.39	--	.65	.020	--	.000	--	12	.21
MAY , 1981									
13...	.79	--	.96	.040	--	.020	--	21	1.7
JUL									
07...	.34	--	.70	.040	--	.020	--	7	.05
OCT									
28...	.59	--	.74	.020	--	<.010	--	3	.04
MAY , 1982									
12...	1.10	--	--	.040	--	.020	--	12	.12
AUG									
11...	--	--	--	--	--	--	--	19	.12
04102770 - BARBER CREEK NEAR GRAND JUNCTION, MI (LAT 42 25 09 LONG 086 03 40)									
APR , 1980									
23...	--	--	--	--	--	--	--	13	.42
OCT									
15...	.50	--	.65	.030	--	.000	--	14	.36
MAY , 1981									
12...	.82	--	.93	.030	--	<.010	--	15	1.7
JUL									
07...	.61	--	.81	.040	--	.020	--	12	.18
OCT									
28...	.39	.53	.51	.020	.020	<.010	<.010	3	.06
MAY , 1982									
12...	1.20	--	1.4	.040	--	.020	--	9	.16
AUG									
11...	--	--	--	--	--	--	--	10	.17
04107740 - PINE CREEK NEAR GORLES, MI (LAT 42 24 40 LONG 085 46 15)									
APR , 1980									
24...	--	--	--	--	--	--	--	--	--
MAY									
22...	--	--	--	--	--	--	--	21	2.2
OCT									
15...	.19	--	.69	.020	--	.010	--	10	.94
MAY , 1981									
11...	1.10	--	3.2	.050	--	.040	--	22	13
JUL									
08...	.44	--	.93	<.010	--	<.010	--	17	1.2
OCT									
27...	.35	.44	1.0	.020	<.010	<.010	<.010	25	2.8
MAY , 1982									
12...	.50	--	1.2	.030	--	.010	--	31	2.6
AUG									
11...	--	--	--	--	--	--	--	34	3.2

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA

DATE	TIME	TURBIDITY (FTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)
04101715 - OSBORNE DRAIN AT KEELER, MI (LAT 42 04 20 LONG 086 05 20)												
MAY , 1981 12...	0835	.80	65	110	10	28	9.7	2.6	.1	5	.7	100
04102140 - EAGLE LAKE DRAIN NEAR LAWTON, MI (LAT 42 10 18 LONG 085 55 00)												
MAY , 1981 12...	1025	1.8	40	210	25	57	17	5.4	.2	5	1.3	180
04102143 - GATES DRAIN AT LAWTON, MI (LAT 42 10 18 LONG 085 54 30)												
MAY , 1981 12...	1135	2.5	33	270	73	73	22	7.7	.2	6	1.7	200
04102165 - EAST BRANCH PAW PAW RIVER NEAR MATTAWAN, MI (LAT 42 40 30 LONG 085 47 22)												
MAY , 1981 11...	1530	1.0	38	180	2.0	45	17	2.5	.1	3	.7	180
04102177 - COOK DRAIN AT MATTAWAN, MI (LAT 42 42 30 LONG 085 49 25)												
MAY , 1981 11...	1800	1.5	60	88	2.0	22	8.0	4.4	.2	10	.7	86
04102240 - BRANDYWINE CREEK NEAR GOBLES, MI (LAT 42 18 53 LONG 085 54 30)												
MAY , 1981 11...	1530	5.0	120	59	16	15	5.2	2.1	.1	7	1.5	56
04102246 - NORTH EXTENSION DRAIN NEAR GOBLES, MI (LAT 42 19 01 LONG 085 55 10)												
MAY , 1981 12...	1445	5.9	48	97	1.0	25	8.5	2.4	.1	5	1.7	93
04102350 - BRUSH CREEK NEAR LAWRENCE, MI (LAT 42 09 24 LONG 086 03 20)												
MAY , 1981 12...	1530	4.8	45	130	19	32	12	3.0	.1	5	1.2	110

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	ARSENIC TOTAL (UG/L AS AS)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)
04101715 - OSBORNE DRAIN AT KEELER, MI (LAT 42 04 20 LONG 086 05 20)												
MAY , 1981 12...	11	5.1	<.1	4.4	.50	145	122	.20	11.4	0	1	10
04102140 - EAGLE LAKE DRAIN NEAR LAWTON, MI (LAT 42 10 18 LONG 085 55 00)												
MAY , 1981 12...	36	5.5	.1	8.3	1.0	285	240	.39	30.0	1	1	<10
04102143 - GATES DRAIN AT LAWTON, MI (LAT 42 10 18 LONG 085 54 30)												
MAY , 1981 12...	69	14	.1	10	1.3	387	318	.53	137	2	1	<10
04102165 - EAST BRANCH PAW PAW RIVER NEAR MATTAWAN, MI (LAT 42 40 30 LONG 085 47 22)												
MAY , 1981 11...	9.8	4.1	.1	8.0	.50	210	200	.29	19.8	0	1	10
04102177 - COOK DRAIN AT MATTAWAN, MI (LAT 42 42 30 LONG 085 49 25)												
MAY , 1981 11...	8.5	6.4	<.1	6.5	.50	124	108	.17	10.4	0	1	20
04102240 - BRANDYWINE CREEK NEAR GOBLES, MI (LAT 42 18 53 LONG 085 54 30)												
MAY , 1981 11...	8.0	5.5	<.1	3.1	1.1	87	65	.12	7.3	0	2	<10
04102246 - NORTH EXTENSION DRAIN NEAR GOBLES, MI (LAT 42 19 01 LONG 085 55 10)												
MAY , 1981 12...	9.1	5.0	<.1	3.7	1.3	126	111	.17	16.3	0	1	<10
04102350 - BRUSH CREEK NEAR LAWRENCE, MI (LAT 42 09 24 LONG 086 03 20)												
MAY , 1981 12...	18	5.3	<.1	7.2	.90	163	145	.22	15.8	1	1	<10

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

STREAMS TRIBUTARY TO LAKE MICHIGAN

WATER-QUALITY DATA

DATE	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	STRON-TIUM, TOTAL RECOV-ERABLE (UG/L AS SR)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)
04101715 - OSBORNE DRAIN AT KEELER, MI (LAT 42 04 20 LONG 086 05 20)												
MAY , 1981 12...	1	5	320	4	<4	40	<.1	9	0	40	30	30
04102140 - EAGLE LAKE DRAIN NEAR LAWTON, MI (LAT 42 10 18 LONG 085 55 00)												
MAY , 1981 12...	1	5	500	4	4	60	<.1	2	0	90	80	40
04102143 - GATES DRAIN AT LAWTON, MI (LAT 42 10 18 LONG 085 54 30)												
MAY , 1981 12...	1	5	900	5	4	80	<.1	4	0	120	110	60
04102165 - EAST BRANCH PAW PAW RIVER NEAR MATTAWAN, MI (LAT 42 40 30 LONG 085 47 22)												
MAY , 1981 11...	1	1	120	1	9	10	<.1	3	0	50	50	20
04102177 - COOK DRAIN AT MATTAWAN, MI (LAT 42 42 30 LONG 085 49 25)												
MAY , 1981 11...	1	7	600	5	<4	20	<.1	6	0	30	30	40
04102240 - BRANDYWINE CREEK NEAR GOBLES, MI (LAT 42 18 53 LONG 085 54 30)												
MAY , 1981 11...	1	3	700	1	<4	40	.1	8	0	20	20	40
04102246 - NORTH EXTENSION DRAIN NEAR GOBLES, MI (LAT 42 19 01 LONG 085 55 10)												
MAY , 1981 12...	1	7	700	4	4	60	<.1	4	0	50	50	30
04102350 - BRUSH CREEK NEAR LAWRENCE, MI (LAT 42 09 24 LONG 086 03 20)												
MAY , 1981 12...	1	10	1100	12	5	80	<.1	8	0	60	50	20

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA

DATE	TIME	TUR-BID-ITY (FTU)	COLOR (PLAT-INUM-COBALT UNITS)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)
04102362 -- RED CREEK NEAR LAWRENCE, MI (LAT 42 10 10 LONG 086 04 15)												
MAY 0, 1981												
18...	0830	9.5	100	97	6.0	25	8.5	1.9	.1	4	1.9	89
04102429 -- PINE CREEK AT HARTFORD, MI (LAT 42 12 20 LONG 086 10 55)												
MAY 0, 1981												
18...	1330	10	25	190	6.0	48	16	14	.4	14	1.8	180
04102587 -- HAVEN-HAX LK DR AT 45 ST NR BLOOMINGDALE, MICH. (LAT 42 22 25 LONG 085 59 11)												
MAY 0, 1981												
12...	1330	6.0	55	88	5.0	17	11	9.7	.5	19	2.3	120
04102589 -- HAVEN-HAX LK DR AT 46.5 ST NR BLOOMINGDALE, MICH (LAT 42 22 08 LONG 086 00 01)												
MAY 0, 1981												
11...	2100	2.6	18	150	3.0	38	14	12	.4	14	2.0	170
04102735 -- MIDDLE BRANCH BLACK RIVER NEAR BLOOMINGDALE, MI (LAT 42 25 09 LONG 086 02 25)												
MAY 0, 1981												
12...	1200	.60	45	81	1.0	21	6.9	7.7	.4	17	.8	77
04102750 -- HELVIN CREEK NEAR BLOOMINGDALE, MI (LAT 42 24 33 LONG 086 00 35)												
MAY 0, 1981												
18...	1340	3.5	40	150	14	37	13	21	.8	24	2.2	130
04102770 -- BARRER CREEK NEAR GRAND JUNCTION, MI (LAT 42 25 09 LONG 086 03 40)												
MAY 0, 1981												
12...	1100	1.1	80	63	7.0	17	5.0	5.7	.3	15	1.2	56
04107740 -- PINE CREEK NEAR GORLES, MI (LAT 42 24 40 LONG 085 46 15)												
MAY 0, 1981												
11...	1830	3.5	60	170	17	47	12	2.5	.1	3	1.8	160

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	ARSENIC TOTAL (UG/L AS AS)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)
04102362 - RED CREEK NEAR LAWRENCE, WI (LAT 42 10 10 LONG 086 04 15)												
MAY , 1981												
13...	9.0	4.6	<.1	4.7	1.4	148	110	.20	7.8	0	2	10
04102429 - PINE CREEK AT HARTFORD, WI (LAT 42 12 20 LONG 086 10 55)												
MAY , 1981												
13...	41	20	.2	6.2	1.3	302	256	.41	13.8	0	1	<10
04102587 - HAVEN-HAX LK DR AT 45 ST NR BLOOMINGDALE, MICH. (LAT 42 22 25 LONG 085 59 11)												
MAY , 1981												
12...	14	17	.1	3.3	1.7	192	162	.26	42.0	0	1	<10
04102589 - HAVEN-HAX LK DR AT 46.5 ST NR BLOOMINGDALE, MICH (LAT 42 22 08 LONG 086 00 01)												
MAY , 1981												
11...	13	25	.1	3.0	1.5	248	200	.34	98.4	0	2	20
04102735 - MIDDLE BRANCH BLACK RIVER NEAR BLOOMINGDALE, WI (LAT 42 25 09 LONG 086 02 25)												
MAY , 1981												
12...	4.2	13	<.1	2.9	.60	120	103	.16	14.6	0	1	20
04102750 - MELVIN CREEK NEAR BLOOMINGDALE, WI (LAT 42 24 33 LONG 086 00 35)												
MAY , 1981												
13...	11	40	.1	4.5	1.6	232	208	.32	18.3	0	1	20
04102770 - BARBER CREEK NEAR GRAND JUNCTION, WI (LAT 42 25 09 LONG 086 03 40)												
MAY , 1981												
12...	12	11	<.1	3.2	.90	117	90	.16	13.0	0	1	<10
04107740 - PINE CREEK NEAR GOBLES, WI (LAT 42 24 40 LONG 085 46 15)												
MAY , 1981												
11...	46	6.4	.1	5.8	1.3	280	280	.39	173	1	3	10

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA

DATE	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	STRON-TIUM, TOTAL RECOV-ERABLE (UG/L AS SR)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)
04102362 - RED CREEK NEAR LAWRENCE, MI (LAT 42 10 10 LONG 086 04 15)												
MAY , 1981												
13...	2	2	1300	1	5	90	<.1	6	0	40	30	30
04102429 - PINE CREEK AT HARTFORD, MI (LAT 42 12 20 LONG 086 10 55)												
MAY , 1981												
13...	1	7	700	1	<4	60	<.1	6	0	80	80	20
04102587 - HAVEN-MAX LK DR AT 45 ST NR BLOOMINGDALE, MICH. (LAT 42 22 25 LONG 085 59 11)												
MAY , 1981												
12...	1	6	900	1	<4	50	<.1	3	0	70	70	30
04102589 - HAVEN-MAX LK DR AT 46.5 ST NR BLOOMINGDALE, MICH (LAT 42 22 09 LONG 086 00 01)												
MAY , 1981												
11...	2	1	310	1	9	50	.1	9	0	120	100	10
04102735 - MIDDLE BRANCH BLACK RIVER NEAR BLOOMINGDALE, MI (LAT 42 25 09 LONG 086 02 25)												
MAY , 1981												
12...	2	5	210	6	<4	10	.1	16	0	70	70	30
04102750 - MELVIN CREEK NEAR BLOOMINGDALE, MI (LAT 42 24 33 LONG 086 00 35)												
MAY , 1981												
13...	1	8	800	4	4	60	<.1	31	0	170	150	70
04102770 - BARBER CREEK NEAR GRAND JUNCTION, MI (LAT 42 25 09 LONG 086 03 40)												
MAY , 1981												
12...	1	6	500	3	<4	40	<.1	4	0	80	60	20
04107740 - PINE CREEK NEAR GOBLES, MI (LAT 42 24 40 LONG 085 46 15)												
MAY , 1981												
11...	1	2	600	1	6	60	<.1	8	0	80	70	30

WATER-QUALITY DATA

DATE	TIME	PCB, DIS-SOLVED (UG/L)	PCB DISSOLV (UG/L)	ALDRIN, DIS-SOLVED (UG/L)	AME-TRYNE TOTAL	ATRA-TONE TOTAL (UG/L)	ATRA-ZINE, TOTAL (UG/L)	CHLOR-DANE, DIS-SOLVED (UG/L)	CYAN-AZINE TOTAL (UG/L)	CYPRA-ZINE TOTAL (UG/L)	DDD, DIS-SOLVED (UG/L)
04101715 - OSBORNE DRAIN AT KEELER, MI (LAT 42 04 20 LONG 086 05 20)											
MAY , 1981											
12...	0835	<.1	<.10	<.01	--	--	--	<.10	--	--	<.01
04102140 - EAGLE LAKE DRAIN NEAR LAWTON, MI (LAT 42 10 18 LONG 085 55 00)											
MAY , 1981											
12...	1025	<.1	<.10	<.01	--	--	--	<.10	--	--	<.01
04102143 - GATES DRAIN AT LAWTON, MI (LAT 42 10 18 LONG 085 54 30)											
MAY , 1981											
12...	1135	<.1	<.10	<.01	--	--	--	<.10	--	--	<.01
04102165 - EAST BRANCH PAW PAW RIVER NEAR MATTAWAN, MI (LAT 42 40 30 LONG 085 47 22)											
MAY , 1981											
11...	1530	<.1	<.10	<.01	--	--	--	<.10	--	--	<.01
21...	1515	--	--	--	<.10	<.10	<.10	--	<.10	<.10	--
04102177 - COOK DRAIN AT MATTAWAN, MI (LAT 42 42 30 LONG 085 49 25)											
MAY , 1981											
11...	1800	<.1	<.10	<.01	--	--	--	<.10	--	--	<.01
21...	1530	--	--	--	<.10	<.10	<.10	--	<.10	<.10	--
04102240 - BRANDYWINE CREEK NEAR GOBLES, MI (LAT 42 18 53 LONG 085 54 30)											
MAY , 1981											
11...	1530	<.1	<.10	<.01	--	--	--	<.10	--	--	<.01
22...	1350	--	--	--	<.10	<.10	<.10	--	<.10	<.10	--
04102246 - NORTH EXTENSION DRAIN NEAR GOBLES, MI (LAT 42 19 01 LONG 085 55 10)											
MAY , 1981											
12...	1415	<.1	<.10	<.01	--	--	--	<.10	--	--	<.01
04102350 - BRUSH CREEK NEAR LAWRENCE, MI (LAT 42 09 24 LONG 086 03 20)											
MAY , 1981											
12...	1530	<.1	<.10	<.01	--	--	--	<.10	--	--	<.01

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA

DATE	DDE, DIS-SOLVED (UG/L)	DDT, DIS-SOLVED (UG/L)	DI-AZINON, DIS-SOLVED (UG/L)	DI-ELDRIN DIS-SOLVED (UG/L)	ENDO-SULFAN DISSOLV (UG/L)	ENDRIN, DIS-SOLVED (UG/L)	ETHION DISSOLV (UG/L)	HEPTA-CHLOR, DIS-SOLVED (UG/L)	HEPTA-CHLOR EPOXIDE DIS-SOLVED (UG/L)	LINDANE DIS-SOLVED (UG/L)	MALA-THION, DIS-SOLVED (UG/L)
04101715 - OSBORNE DRAIN AT KEELER, MI (LAT 42 04 20 LONG 086 05 20)											
MAY , 1981											
12...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
04102140 - EAGLE LAKE DRAIN NEAR LAWTON, MI (LAT 42 10 18 LONG 085 55 00)											
MAY , 1981											
12...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
04102143 - GATES DRAIN AT LAWTON, MI (LAT 42 10 18 LONG 085 54 30)											
MAY , 1981											
12...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
04102165 - EAST BRANCH PAW PAW RIVER NEAR MATTAWAN, MI (LAT 42 40 30 LONG 085 47 22)											
MAY , 1981											
11...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
21...	--	--	--	--	--	--	--	--	--	--	--
04102177 - COOK DRAIN AT MATTAWAN, MI (LAT 42 42 30 LONG 085 49 25)											
MAY , 1981											
11...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
21...	--	--	--	--	--	--	--	--	--	--	--
04102240 - BRANDYWINE CREEK NEAR GOBLES, MI (LAT 42 18 53 LONG 085 54 30)											
MAY , 1981											
11...	<.01	<.01	.02	<.01	<.01	<.01	<.01	.01	<.01	<.01	<.01
22...	--	--	--	--	--	--	--	--	--	--	--
04102246 - NORTH EXTENSION DRAIN NEAR GOBLES, MI (LAT 42 19 01 LONG 085 55 10)											
MAY , 1981											
12...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
04102350 - BRUSH CREEK NEAR LAWRENCE, MI (LAT 42 09 24 LONG 086 03 20)											
MAY , 1981											
12...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA

DATE	METHO-MYL TOTAL (UG/L)	METH-OXY-CHLOR DISSOLV (UG/L)	METHYL PARA-THION, DIS-SOLVED (UG/L)	MET-HYL-TRI-THION DISSOLV (UG/L)	MIREX, DIS-SOLVED (UG/L)	PARA-THION, DIS-SOLVED (UG/L)	PER-THANE DISSOLV (UG/L)	PROME-TONE TOTAL (UG/L)	PROME-TRYNE TOTAL (UG/L)	PRO-PAZINE TOTAL (UG/L)	PROPHAM TOTAL (UG/L)
04101715 - OSBORNE DRAIN AT KEELER, MI (LAT 42 04 20 LONG 086 05 20)											
MAY , 1981											
12...	.0	<.01	<.01	<.01	<.01	<.01	<.01	--	--	--	.0
04102140 - EAGLE LAKE DRAIN NEAR LAWTON, MI (LAT 42 10 18 LONG 085 55 00)											
MAY , 1981											
12...	.0	<.01	<.01	<.01	<.01	<.01	<.01	--	--	--	.0
04102143 - GATES DRAIN AT LAWTON, MI (LAT 42 10 18 LONG 085 54 30)											
MAY , 1981											
12...	.0	<.01	<.01	<.01	<.01	<.01	<.01	--	--	--	.0
04102165 - EAST BRANCH PAW PAW RIVER NEAR MATTAWAN, MI (LAT 42 40 30 LONG 085 47 22)											
MAY , 1981											
11...	--	<.01	<.01	<.01	<.01	<.01	<.01	--	--	--	--
21...	--	--	--	--	--	--	--	<.1	<.1	<.10	--
04102177 - COOK DRAIN AT MATTAWAN, MI (LAT 42 42 30 LONG 085 49 25)											
MAY , 1981											
11...	--	<.01	<.01	<.01	<.01	<.01	<.01	--	--	--	--
21...	--	--	--	--	--	--	--	<.1	<.1	<.10	--
04102240 - BRANDYWINE CREEK NEAR GOBLES, MI (LAT 42 18 53 LONG 085 54 30)											
MAY , 1981											
11...	--	<.01	<.01	<.01	<.01	<.01	<.01	--	--	--	--
22...	--	--	--	--	--	--	--	<.1	<.1	<.10	--
04102246 - NORTH EXTENSION DRAIN NEAR GOBLES, MI (LAT 42 19 01 LONG 085 55 10)											
MAY , 1981											
12...	.0	<.01	<.01	<.01	<.01	<.01	<.01	--	--	--	.0
04102350 - BRUSH CREEK NEAR LAWRENCE, MI (LAT 42 09 24 LONG 086 03 20)											
MAY , 1981											
12...	.0	<.01	<.01	<.01	<.01	<.01	<.01	--	--	--	.0

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA

DATE	SEVIN, TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	SIMA-ZINE TOTAL (UG/L)	SIME-TONE TOTAL (UG/L)	SIME-TRYNE TOTAL (UG/L)	TOX-APHENE, DIS-SOLVED (UG/L)	TRI-THION DISSOLV (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
04101715 - OSBORNE DRAIN AT NEELER, MI (LAT 42 04 28 LONG 086 05 28)										
MAY , 1981										
12...	.00	<.01	--	--	--	<1.0	<.01	<.01	<.01	<.01
04102140 - EAGLE LAKE DRAIN NEAR LAWTON, MI (LAT 42 10 18 LONG 085 55 00)										
MAY , 1981										
12...	.00	<.01	--	--	--	<1.0	<.01	<.01	<.01	<.01
04102143 - GATES DRAIN AT LAWTON, MI (LAT 42 10 18 LONG 085 54 30)										
MAY , 1981										
12...	.00	<.01	--	--	--	<1.0	<.01	<.01	<.01	<.01
04102165 - EAST BRANCH PAW PAW RIVER NEAR MATTAWAN, MI (LAT 42 40 30 LONG 085 47 22)										
MAY , 1981										
11...	--	<.01	--	--	--	<1.0	<.01	<.01	<.01	<.01
21...	--	--	<.10	<.10	<.1	--	--	--	--	--
04102177 - COOK DRAIN AT MATTAWAN, MI (LAT 42 42 30 LONG 085 49 25)										
MAY , 1981										
11...	--	<.01	--	--	--	<1.0	<.01	.01	<.01	<.01
21...	--	--	<.10	<.10	<.1	--	--	--	--	--
04102240 - BRANDYWINE CREEK NEAR GOBLES, MI (LAT 42 18 53 LONG 085 54 30)										
MAY , 1981										
11...	--	<.01	--	--	--	<1.0	<.01	<.01	<.01	<.01
22...	--	--	<.10	<.10	<.1	--	--	--	--	--
04102246 - NORTH EXTENSION DRAIN NEAR GOBLES, MI (LAT 42 19 01 LONG 085 55 10)										
MAY , 1981										
12...	.00	<.01	--	--	--	<1.0	<.01	.01	<.01	<.01
04102350 - BRUSH CREEK NEAR LAWRENCE, MI (LAT 42 09 24 LONG 086 03 20)										
MAY , 1981										
12...	.00	<.01	--	--	--	<1.0	<.01	<.01	<.01	<.01

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA

DATE	TIME	PCB, DIS-SOLVED (UG/L)	PCN DISSOLV (UG/L)	ALDRIN, DIS-SOLVED (UG/L)	AME-TRYNE TOTAL	ATRA-TONE TOTAL (UG/L)	ATRA-ZINE, TOTAL (UG/L)	CHLOR-DANE, DIS-SOLVED (UG/L)	CYAN-AZINE TOTAL (UG/L)	CYPRA-ZINE TOTAL (UG/L)	DDD, DIS-SOLVED (UG/L)
04102362 - RED CREEK NEAR LAWRENCE, MI (LAT 42 10 10 LONG 086 04 15)											
MAY , 1981											
13...	0830	<.1	<.10	<.01	--	--	--	<.10	--	--	<.01
04102429 - PINE CREEK AT HARTFORD, MI (LAT 42 12 20 LONG 086 10 55)											
MAY , 1981											
13...	1330	<.1	<.10	<.01	--	--	--	<.10	--	--	<.01
04102587 - HAVEN-MAX LK DR AT 45 ST NR BLOOMINGDALE, MICH. (LAT 42 22 25 LONG 085 59 11)											
MAY , 1981											
12...	1330	<.1	<.10	<.01	--	--	--	<.10	--	--	<.01
22...	1135	--	--	--	<.10	<.10	.50	--	<.10	<.10	--
04102589 - HAVEN-MAX LK DR AT 46.5 ST NR BLOOMINGDALE, MICH (LAT 42 22 08 LONG 086 00 01)											
MAY , 1981											
11...	2100	<.1	<.10	<.01	--	--	--	<.10	--	--	<.01
22...	1125	--	--	--	<.10	<.10	.30	--	<.10	<.10	--
04102735 - MIDDLE BRANCH BLACK RIVER NEAR BLOOMINGDALE, MI (LAT 42 25 09 LONG 086 02 25)											
MAY , 1981											
12...	1200	<.1	<.10	<.01	--	--	--	<.10	--	--	<.01
22...	1243	--	--	--	<.10	<.10	<.10	--	<.10	<.10	--
04102750 - MELVIN CREEK NEAR BLOOMINGDALE, MI (LAT 42 24 33 LONG 086 00 35)											
MAY , 1981											
13...	1340	<.1	<.10	<.01	--	--	--	<.10	--	--	<.01
04102770 - BARBER CREEK NEAR GRAND JUNCTION, MI (LAT 42 25 09 LONG 086 03 40)											
MAY , 1981											
12...	1100	<.1	<.10	<.01	--	--	--	<.10	--	--	<.01
04107740 - PINE CREEK NEAR GORLES, MI (LAT 42 24 40 LONG 085 46 15)											
MAY , 1981											
11...	1830	<.1	<.10	<.01	--	--	--	<.10	--	--	<.01
22...	1325	--	--	--	<.10	<.10	<.10	--	<.10	<.10	--

WATER-QUALITY DATA

DATE	DDE, DIS-SOLVED (UG/L)	DDT, DIS-SOLVED (UG/L)	DI-AZINON, DIS-SOLVED (UG/L)	DI-ELDRIN DIS-SOLVED (UG/L)	ENDO-SULFAN DISSOLV (UG/L)	ENDRIN, DIS-SOLVED (UG/L)	ETHION DISSOLV (UG/L)	HEPTA-CHLOR, DIS-SOLVED (UG/L)	HEPTA-CHLOR EPOXIDE DIS-SOLVED (UG/L)	LINDANE DIS-SOLVED (UG/L)	MALA-THION, DIS-SOLVED (UG/L)
04102362 - RED CREEK NEAR LAWRENCE, MI (LAT 42 10 10 LONG 086 04 15)											
MAY , 1981											
13...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
04102429 - PINE CREEK AT HARTFORD, MI (LAT 42 12 20 LONG 086 10 55)											
MAY , 1981											
13...	<.01	<.01	.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
04102587 - HAVEN-MAX LK DR AT 45 ST NR BLOOMINGDALE, MICH. (LAT 42 22 25 LONG 085 59 11)											
MAY , 1981											
12...	<.01	<.01	.02	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
22...	--	--	--	--	--	--	--	--	--	--	--
04102589 - HAVEN-MAX LK DR AT 46.5 ST NR BLOOMINGDALE, MICH (LAT 42 22 08 LONG 086 00 01)											
MAY , 1981											
11...	<.01	<.01	.01	.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
22...	--	--	--	--	--	--	--	--	--	--	--
04102735 - MIDDLE BRANCH BLACK RIVER NEAR BLOOMINGDALE, MI (LAT 42 25 09 LONG 086 02 25)											
MAY , 1981											
12...	<.01	<.01	.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
22...	--	--	--	--	--	--	--	--	--	--	--
04102750 - MELVIN CREEK NEAR BLOOMINGDALE, MI (LAT 42 24 33 LONG 086 00 35)											
MAY , 1981											
13...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
04102770 - BARBER CREEK NEAR GRAND JUNCTION, MI (LAT 42 25 09 LONG 086 03 40)											
MAY , 1981											
12...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
04107740 - PINE CREEK NEAR GOBLES, MI (LAT 42 24 40 LONG 085 46 15)											
MAY , 1981											
11...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
22...	--	--	--	--	--	--	--	--	--	--	--

STREAMS TRIBUTARY TO LAKE MICHIGAN

WATER-QUALITY DATA

DATE	METHO-MYL TOTAL (UG/L)	METH-OXY-CHLOR DISSOLV (UG/L)	METHYL PARA-THION, DIS-SOLVED (UG/L)	METHYL-TRI-THION DISSOLV (UG/L)	MIREX, DIS-SOLVED (UG/L)	PARA-THION, DIS-SOLVED (UG/L)	PER-THANE DISSOLV (UG/L)	PROME-TONE TOTAL (UG/L)	PROME-TRYNE TOTAL (UG/L)	PRO-PAZINE TOTAL (UG/L)	PROPHAM TOTAL (UG/L)
04102362 - RED CREEK NEAR LAWRENCE, MI (LAT 42 10 10 LONG 086 04 15)											
MAY , 1981											
13...	.0	<.01	<.01	<.01	<.01	<.01	<.01	--	--	--	.0
04102429 - PINE CREEK AT HARTFORD, MI (LAT 42 12 20 LONG 086 10 55)											
MAY , 1981											
13...	.0	<.01	<.01	<.01	<.01	<.01	<.01	--	--	--	.0
04102587 - HAVEN-MAX LK DR AT 45 ST NR BLOOMINGDALE, MICH. (LAT 42 22 25 LONG 085 59 11)											
MAY , 1981											
12...	--	<.01	<.01	<.01	<.01	<.01	<.01	--	--	--	--
22...	--	--	--	--	--	--	--	<.1	.0	<.10	--
04102589 - HAVEN-MAX LK DR AT 46.5 ST NR BLOOMINGDALE, MICH (LAT 42 22 08 LONG 086 00 01)											
MAY , 1981											
11...	--	<.01	<.01	<.01	<.01	<.01	<.01	--	--	--	--
22...	--	--	--	--	--	--	--	<.1	.0	<.10	--
04102735 - MIDDLE BRANCH BLACK RIVER NEAR BLOOMINGDALE, MI (LAT 42 25 09 LONG 086 02 25)											
MAY , 1981											
12...	--	<.01	<.01	<.01	<.01	<.01	<.01	--	--	--	--
22...	--	--	--	--	--	--	--	<.1	<.1	<.10	--
04102750 - MELVIN CREEK NEAR BLOOMINGDALE, MI (LAT 42 24 33 LONG 086 00 35)											
MAY , 1981											
13...	.0	<.01	<.01	<.01	<.01	<.01	<.01	--	--	--	.0
04102770 - BARBER CREEK NEAR GRAND JUNCTION, MI (LAT 42 25 09 LONG 086 03 40)											
MAY , 1981											
12...	.0	<.01	<.01	<.01	<.01	<.01	<.01	--	--	--	.0
04107740 - PINE CREEK NEAR GOBLES, MI (LAT 42 24 40 LONG 085 46 15)											
MAY , 1981											
11...	--	<.01	<.01	<.01	<.01	<.01	<.01	--	--	--	--
22...	--	--	--	--	--	--	--	<.1	<.1	<.10	--

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA

DATE	SEVIN, TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	SIMAZINE TOTAL (UG/L)	SIMETONE TOTAL (UG/L)	SIMETRYNE TOTAL (UG/L)	TOXAPHENE, DISSOLVED (UG/L)	TRITHION DISSOLV (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
04102362 - RED CREEK NEAR LAWRENCE, MI (LAT 42 10 10 LONG 086 04 15)										
MAY , 1981										
13...	.00	<.01	--	--	--	<1.0	<.01	<.01	<.01	<.01
04102429 - PINE CREEK AT HARTFORD, MI (LAT 42 12 20 LONG 086 10 55)										
MAY , 1981										
13...	.00	<.01	--	--	--	<1.0	<.01	<.01	<.01	<.01
04102587 - HAVEN-MAX LK DR AT 45 ST NR BLOOMINGDALE, MICH. (LAT 42 22 25 LONG 085 59 11)										
MAY , 1981										
12...	--	--	--	--	--	<1.0	<.01	--	--	--
22...	--	--	.07	<.10	<.1	--	--	--	--	--
04102589 - HAVEN-MAX LK DR AT 46.5 ST NR BLOOMINGDALE, MICH (LAT 42 22 08 LONG 086 00 01)										
MAY , 1981										
11...	--	<.01	--	--	--	<1.0	<.01	.86	<.01	<.01
22...	--	--	.07	<.10	<.1	--	--	--	--	--
04102735 - MIDDLE BRANCH BLACK RIVER NEAR BLOOMINGDALE, MI (LAT 42 25 09 LONG 086 02 25)										
MAY , 1981										
12...	--	<.01	--	--	--	<1.0	<.01	.03	<.01	<.01
22...	--	--	<.10	<.10	<.1	--	--	--	--	--
04102750 - MELVIN CREEK NEAR BLOOMINGDALE, MI (LAT 42 24 33 LONG 086 00 35)										
MAY , 1981										
13...	.00	<.01	--	--	--	<1.0	<.01	.47	<.01	<.01
04102770 - BARBER CREEK NEAR GRAND JUNCTION, MI (LAT 42 25 09 LONG 086 03 40)										
MAY , 1981										
12...	.00	<.01	--	--	--	<1.0	<.01	<.01	<.01	<.01
04107740 - PINE CREEK NEAR GOBLES, MI (LAT 42 24 40 LONG 085 46 15)										
MAY , 1981										
11...	--	<.01	--	--	--	<1.0	<.01	<.01	<.01	<.01
22...	--	--	<.10	<.10	<.1	--	--	--	--	--

Samples are collected at sites other than gaging stations and partial-record stations to give better areal coverage in a river basin. Such sites are referred to as miscellaneous sites.

STREAMS TRIBUTARY TO LAKE MICHIGAN

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	PCB, DIS-SOLVED (UG/L)	PCB DISSOLV (UG/L)	ALDRIN, DIS-SOLVED (UG/L)	AME-TRYNE TOTAL	ATRA-TONE TOTAL (UG/L)	ATRA-ZINE, TOTAL (UG/L)	CHLOR-DANE, DIS-SOLVED (UG/L)	CYAN-AZINE TOTAL (UG/L)
420429086120801 - CROOKED LAKE AT SISTER LAKES, MI (LAT 42 04 29 LONG 086 12 08)												
MAY , 1982												
20...	1315	270	8.8	25.5	<.1	<.10	<.01	<.10	<.10	<.10	<.10	<.10
420500085492501 - CEDAR LAKE NEAR MARCELLUS, MI (LAT 42 05 00 LONG 085 49 25)												
MAY , 1982												
21...	1430	250	8.3	20.0	<.1	<.10	<.01	<.10	<.10	.20	<.10	<.10
420607086030801 - KNICKERBOCKER LAKE NEAR DECATUR, MI (LAT 42 06 07 LONG 086 03 08)												
MAY , 1982												
21...	0900	--	7.6	21.0	<.1	<.10	<.01	<.10	<.10	<.10	<.10	<.10
420612086075001 - KEELER LAKE NEAR KEELER, MI (LAT 42 06 12 LONG 086 07 50)												
MAY , 1982												
20...	1430	--	8.2	25.5	<.1	<.10	<.01	<.10	<.10	<.10	<.10	<.10
420650086002201 - LAKE OF THE WOODS NEAR DECATUR, MI (LAT 42 06 50 LONG 086 00 22)												
MAY , 1982												
21...	1400	370	8.4	20.0	<.1	<.10	<.01	<.10	<.10	<.10	<.10	<.10
421227085585901 - CORA LAKE NEAR LAWRENCE, MI (LAT 42 12 27 LONG 085 58 59)												
MAY , 1982												
20...	1145	240	8.4	18.5	<.1	<.10	<.01	<.10	<.10	<.10	<.10	<.10
421406085531002 - MAPLE LAKE AT PAW PAW, MI (LAT 42 14 06 LONG 085 53 10)												
MAY , 1982												
21...	1500	470	8.2	19.5	<.1	<.10	<.01	<.10	<.10	<.10	<.10	<.10
421500086112801 - VAN AUKEN LAKE NEAR MCDONALD, MI (LAT 42 15 00 LONG 086 11 28)												
MAY , 1982												
21...	1245	330	8.1	20.0	<.1	<.10	<.01	<.10	<.10	.20	<.10	<.10
422038086010201 - UPPER JEPHTHA LAKE NEAR BREEDSVILLE, MI (LAT 42 20 38 LONG 086 01 02)												
MAY , 1982												
21...	1030	330	8.3	22.0	<.1	<.10	<.01	<.10	<.10	<.10	<.10	<.10
422158085592701 - GREAT BEAR LAKE NEAR BLOOMINGDALE, MI (LAT 42 21 58 LONG 085 59 27)												
MAY , 1982												
21...	1115	375	8.5	22.0	<.1	<.10	<.01	<.10	.10	.30	<.10	<.10
422330086031001 - SADDLE LAKE NEAR GRAND JUNCTION, MI (LAT 42 23 30 LONG 086 03 10)												
MAY , 1982												
21...	1135	260	8.0	19.0	<.1	<.10	<.01	<.10	<.10	<.10	<.10	<.10

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS LAKES

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	CYPRA-ZINE TOTAL (UG/L)	DDD, DIS-SOLVED (UG/L)	DDE, DIS-SOLVED (UG/L)	DDT, DIS-SOLVED (UG/L)	DI-AZINON, DIS-SOLVED (UG/L)	DI-ELDRIN DIS-SOLVED (UG/L)	ENDO-SULFAN DISSOLV (UG/L)	ENDRIN, DIS-SOLVED (UG/L)	ETHION DISSOLV (UG/L)	HEPTA-CHLOR, DIS-SOLVED (UG/L)	HEPTA-CHLOR EPOXIDE DIS-SOLVED (UG/L)	LINDANE DIS-SOLVED (UG/L)
420429086120801 - CROOKED LAKE AT SISTER LAKES, MI (LAT 42 04 29 LONG 086 12 08)												
MAY , 1982												
20...	<.10	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
420500085492501 - CEDAR LAKE NEAR MARCELLUS, MI (LAT 42 05 00 LONG 085 49 25)												
MAY , 1982												
21...	<.10	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
420607086030801 - KNICKERBOCKER LAKE NEAR DECATUR, MI (LAT 42 06 07 LONG 086 03 08)												
MAY , 1982												
21...	<.10	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
420612086075001 - KEELER LAKE NEAR KEELER, MI (LAT 42 06 12 LONG 086 07 50)												
MAY , 1982												
20...	<.10	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
420650086002201 - LAKE OF THE WOODS NEAR DECATUR, MI (LAT 42 06 50 LONG 086 00 22)												
MAY , 1982												
21...	<.10	<.01	<.01	<.01	--	<.01	<.01	<.01	--	<.01	<.01	<.01
421227085585901 - CORA LAKE NEAR LAWRENCE, MI (LAT 42 12 27 LONG 085 58 59)												
MAY , 1982												
20...	<.10	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
421406085531002 - MAPLE LAKE AT PAW PAW, MI (LAT 42 14 06 LONG 085 53 10)												
MAY , 1982												
21...	<.10	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
421500086112801 - VAN AUKEN LAKE NEAR MCDONALD, MI (LAT 42 15 00 LONG 086 11 28)												
MAY , 1982												
21...	<.10	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
422038086010201 - UPPER JEPHTHA LAKE NEAR BREEDSVILLE, MI (LAT 42 20 38 LONG 086 01 02)												
MAY , 1982												
21...	<.10	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
422158085592701 - GREAT BEAR LAKE NEAR BLOOMINGDALE, MI (LAT 42 21 58 LONG 085 59 27)												
MAY , 1982												
21...	<.10	<.01	<.01	<.01	.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
422330086031001 - SADDLE LAKE NEAR GRAND JUNCTION, MI (LAT 42 23 30 LONG 086 03 10)												
MAY , 1982												
21...	<.10	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS LAKES

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	MALA-THION, DIS-SOLVED (UG/L)	METHO-MYL TOTAL (UG/L)	METH-OXY-CHLOR DISSOLV (UG/L)	METHYL PARA-THION, DIS-SOLVED (UG/L)	METHYL-TRI-THION DISSOLV (UG/L)	MIREX, DIS-SOLVED (UG/L)	PARA-THION, DIS-SOLVED (UG/L)	PER-THANE DISSOLV (UG/L)	PRO-PAZINE TOTAL (UG/L)	PROME-TONE TOTAL (UG/L)	PROME-TRYNE TOTAL (UG/L)
420429086120801 - CROOKED LAKE AT SISTER LAKES, MI (LAT 42 04 29 LONG 086 12 08)											
MAY , 1982											
20...	<.01	<.1	<.01	<.01	<.01	<.01	<.01	<.10	<.10	<.1	<.1
420500085492501 - CEDAR LAKE NEAR MARCELLUS, MI (LAT 42 05 00 LONG 085 49 25)											
MAY , 1982											
21...	<.01	<.1	<.01	<.01	<.01	<.01	<.01	<.10	<.10	<.1	<.1
420607086030801 - KNICKERBOCKER LAKE NEAR DECATUR, MI (LAT 42 06 07 LONG 086 03 08)											
MAY , 1982											
21...	<.01	<.1	<.01	<.01	<.01	<.01	<.01	<.10	<.10	<.1	<.1
420612086075001 - KEELER LAKE NEAR KEELER, MI (LAT 42 06 12 LONG 086 07 50)											
MAY , 1982											
20...	<.01	<.1	<.01	<.01	<.01	<.01	<.01	<.10	<.10	<.1	<.1
420650086002201 - LAKE OF THE WOODS NEAR DECATUR, MI (LAT 42 06 50 LONG 086 00 22)											
MAY , 1982											
21...	--	<.1	<.01	--	<.01	<.01	--	<.10	<.10	<.1	<.1
421227085585901 - CORA LAKE NEAR LAWRENCE, MI (LAT 42 12 27 LONG 085 58 59)											
MAY , 1982											
20...	<.01	<.1	<.01	<.01	<.01	<.01	<.01	<.10	<.10	<.1	<.1
421406085531002 - MAPLE LAKE AT PAW PAW, MI (LAT 42 14 06 LONG 085 53 10)											
MAY , 1982											
21...	<.01	<.1	<.01	<.01	<.01	<.01	<.01	<.10	<.10	<.1	<.1
421500086112801 - VAN AUKEN LAKE NEAR MCDONALD, MI (LAT 42 15 00 LONG 086 11 28)											
MAY , 1982											
21...	<.01	<.1	<.01	<.01	<.01	<.01	<.01	<.10	<.10	<.1	<.1
422038086010201 - UPPER JEPHTHA LAKE NEAR BREEDSVILLE, MI (LAT 42 20 38 LONG 086 01 02)											
MAY , 1982											
21...	<.01	<.1	<.01	<.01	<.01	<.01	<.01	<.10	<.10	<.1	<.1
422158085592701 - GREAT BEAR LAKE NEAR BLOOMINGDALE, MI (LAT 42 21 58 LONG 085 59 27)											
MAY , 1982											
21...	<.01	<.1	<.01	<.01	<.01	<.01	<.01	<.10	<.10	<.1	<.1
422330086031001 - SADDLE LAKE NEAR GRAND JUNCTION, MI (LAT 42 23 30 LONG 086 03 10)											
MAY , 1982											
21...	<.01	<.1	<.01	<.01	<.01	<.01	<.01	<.10	<.10	<.1	<.1

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	PROPHAM TOTAL (UG/L)	SEVIN, TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	STRA-ZINE TOTAL (UG/L)	STRF-TONF TOTAL (UG/L)	STRF-TRYNF TOTAL (UG/L)	TOX-APHENE, DIS-SOLVED (UG/L)	TRI-THION DISSOLV (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
420429086120801 - CROOKED LAKE AT SISTER LAKES, MI (LAT 42 04 29 LONG 086 12 08)											
MAY , 1982											
20...	<.1	<.10	.20	<.10	<.10	<.1	<1.0	<.01	1.6	<.01	<.01
420500085492501 - CEDAR LAKE NEAR MARCELLUS, MI (LAT 42 05 00 LONG 085 49 25)											
MAY , 1982											
21...	<.1	<.10	<.01	<.10	<.10	<.1	<1.0	<.01	.01	<.01	<.01
420607086030801 - KNICKERBOCKER LAKE NEAR DECATUR, MI (LAT 42 06 07 LONG 086 03 08)											
MAY , 1982											
21...	<.1	<.10	<.01	<.10	<.10	<.1	<1.0	<.01	<.01	<.01	<.01
420612086075001 - KEELER LAKE NEAR KEELER, MI (LAT 42 06 12 LONG 086 07 50)											
MAY , 1982											
20...	<.1	<.10	<.01	<.10	<.10	<.1	<1.0	<.01	1.1	<.01	<.01
420650086002201 - LAKE OF THE WOODS NEAR DECATUR, MI (LAT 42 06 50 LONG 086 00 22)											
MAY , 1982											
21...	<.1	<.10	<.01	<.10	<.10	<.1	<1.0	--	.64	<.01	<.01
421227085585901 - CORA LAKE NEAR LAWRENCE, MI (LAT 42 12 27 LONG 085 58 59)											
MAY , 1982											
20...	<.1	<.10	<.01	<.10	<.10	<.1	<1.0	<.01	.04	<.01	<.01
421406085531002 - MAPLE LAKE AT PAW PAW, MI (LAT 42 14 06 LONG 085 53 10)											
MAY , 1982											
21...	<.1	<.10	<.01	<.10	<.10	<.1	<1.0	<.01	<.01	<.01	<.01
421500086112801 - VAN AUKEN LAKE NEAR MCDONALD, MI (LAT 42 15 00 LONG 086 11 28)											
MAY , 1982											
21...	<.1	<.10	<.01	.10	<.10	<.1	<1.0	<.01	.06	<.01	<.01
422038086010201 - UPPER JEPHTHA LAKE NEAR BREEDSVILLE, MI (LAT 42 20 38 LONG 086 01 02)											
MAY , 1982											
21...	<.1	<.10	<.01	<.10	<.10	<.1	<1.0	<.01	1.7	<.01	<.01
422158085592701 - GREAT BEAR LAKE NEAR BLOOMINGDALE, MI (LAT 42 21 58 LONG 085 59 27)											
MAY , 1982											
21...	<.1	<.10	<.01	<.10	<.10	<.1	<1.0	<.01	.19	<.01	<.01
422330086031001 - SADDLE LAKE NEAR GRAND JUNCTION, MI (LAT 42 23 30 LONG 086 03 10)											
MAY , 1982											
21...	<.1	<.10	<.01	<.10	<.10	<.1	<1.0	<.01	2.6	<.01	<.01

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)
420429086120801 - CROOKED LAKE AT SISTER LAKES, WI (LAT 42 04 29 LONG 086 12 08)											
AUG , 1982											
31...	1500	220	8.5	23.5	9.2	106	120	23	27	13	7.3
420500085492501 - CEDAR LAKE NEAR MARCELLUS, MI (LAT 42 05 00 LONG 085 49 25)											
AUG , 1982											
25...	0830	200	8.5	21.5	7.2	80	120	8.0	27	13	2.2
420607086030801 - KNICKERBOCKER LAKE NEAR DECATUR, MI (LAT 42 06 07 LONG 086 03 08)											
AUG , 1982											
25...	1330	18	6.4	24.5	6.5	76	6	.00	1.8	.4	.3
420612086075001 - KEELER LAKE NEAR KEELER, MI (LAT 42 06 12 LONG 086 07 50)											
AUG , 1982											
26...	1530	50	8.1	24.0	6.6	78	23	1.0	6.1	1.9	.4
420805085485001 - MUZZYS LAKE NR LAWTON MI (LAT 42 08 05 LONG 085 48 50)											
AUG , 1982											
26...	0900	155	8.9	23.0	4.2	71	92	6.0	21	9.6	1.5
421015086011001 - CHRISTIE LAKE NR LAWRENCE MI (LAT 42 10 15 LONG 086 01 10)											
AUG , 1982											
26...	1330	185	8.6	25.0	6.5	77	120	20	24	14	1.6
421227085585901 - CORA LAKE NEAR LAWRENCE, MI (LAT 42 12 27 LONG 085 58 59)											
AUG , 1982											
26...	1130	185	8.9	24.0	4.4	74	98	12	21	11	6.0

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	SULFATE DIS-SOLVED (MG/L AS SO4)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
420429086120801 - CROOKED LAKE AT SISTER LAKES, MI (LAT 42 04 29 LONG 086 12 08)											
AUG , 1982											
31...	12	.3	.6	99	16	18	<.1	.4	175	133	.24
420500085492501 - CEDAR LAKE NEAR MARCELLUS, MI (LAT 42 05 00 LONG 085 49 25)											
AUG , 1982											
25...	4	.1	.6	113	3.5	9.0	.2	2.0	143	125	.19
420607086030801 - KNICKERBOCKER LAKE NEAR DECATUR, MI (LAT 42 06 07 LONG 086 03 08)											
AUG , 1982											
25...	--	.1	<.1	8.0	.4	3.0	<.1	.2	28	11	.04
420612086075001 - KEFLER LAKE NEAR KEELER, MI (LAT 42 06 12 LONG 086 07 50)											
AUG , 1982											
26...	--	.0	<.1	22	.9	3.0	.1	.3	40	26	.05
420805085485001 - WUZZYS LAKE NR LAWTON MI (LAT 42 08 05 LONG 085 48 50)											
AUG , 1982											
26...	3	.1	.3	86	3.2	6.0	.1	.9	117	94	.16
421015086011001 - CHRISTIE LAKE NR LAWRENCE MI (LAT 42 10 15 LONG 086 01 10)											
AUG , 1982											
26...	3	.1	.6	98	3.2	13	.1	.8	141	116	.19
421227085585901 - CORA LAKE NEAR LAWRENCE, MI (LAT 42 12 27 LONG 085 58 59)											
AUG , 1982											
26...	12	.3	.3	86	13	8.0	.1	.7	147	112	.20

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS LAKES

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	LITHIUM DISSOLVED (UG/L AS LI)	STRONTIUM, DISSOLVED (UG/L AS SR)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C)
420429086120801 - CROOKED LAKE AT SISTER LAKES, MI (LAT 42 04 29 LONG 086 12 08)											
AUG , 1982											
31...	<.010	<.10	<.010	.50	.50	.020	.010	<4	41	4.7	.4
420500085492501 - CEDAR LAKE NEAR MARCELLUS, MI (LAT 42 05 00 LONG 085 49 25)											
AUG , 1982											
25...	<.010	<.10	<.010	.90	.90	.020	.020	<4	33	4.8	.8
420607086030801 - KNICKERBOCKER LAKE NEAR DECATUR, MI (LAT 42 06 07 LONG 086 03 08)											
AUG , 1982											
25...	<.010	<.10	<.010	.40	.40	.040	<.010	<4	2	7.2	.7
420612086075001 - KEELER LAKE NEAR KEELER, MI (LAT 42 06 12 LONG 086 07 50)											
AUG , 1982											
26...	<.010	<.10	<.010	.20	.20	<.010	<.010	<4	13	5.0	--
420805085485001 - HUZZYS LAKE NR LAWTON MI (LAT 42 08 05 LONG 085 48 50)											
AUG , 1982											
26...	.020	<.10	<.010	.30	.30	.010	<.010	<4	25	4.4	--
421015086011001 - CHRISTIE LAKE NR LAWRENCE MI (LAT 42 10 15 LONG 086 01 10)											
AUG , 1982											
26...	<.010	<.10	<.010	.50	.50	.010	<.010	<4	28	4.6	.9
421227085585901 - CORA LAKE NEAR LAWRENCE, MI (LAT 42 12 27 LONG 085 58 59)											
AUG , 1982											
26...	<.010	<.10	<.010	.50	.50	.010	<.010	<4	28	5.3	--

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)
421500086112801 - VAN AUKEN LAKE NEAR MCDONALD, MI (LAT 42 15 00 LONG 086 11 28)											
SEP , 1982											
01...	1200	280	8.6	22.5	9.2	93	140	23	31	15	13
421818086101501 - MERRIMANS LAKE NR BRADFORD MI (LAT 42 18 18 LONG 086 10 15)											
SEP , 1982											
01...	1300	300	8.6	23.5	6.2	71	170	20	43	15	8.0
421915085483001 - FISH LAKE NEAR GORLES MI (LAT 42 19 15 LONG 085 48 30)											
AUG , 1982											
24...	1530	305	8.1	24.0	6.9	81	180	4.0	42	17	5.4
422038086010201 - UPPER JEPHTHA LAKE NEAR BREEDSVILLE, MI (LAT 42 20 38 LONG 086 01 02)											
SEP , 1982											
02...	1200	295	8.5	22.5	9.0	102	170	19	41	16	5.2
422158085592701 - GREAT BEAR LAKE NEAR BLOOMINGDALE, MI (LAT 42 21 58 LONG 085 59 27)											
AUG , 1982											
12...	1200	350	8.3	23.0	7.2	82	160	24	37	16	14
422330086031001 - SADDLE LAKE NEAR GRAND JUNCTION, MI (LAT 42 23 30 LONG 086 03 10)											
AUG , 1982											
12...	1330	240	7.6	23.0	5.3	60	110	12	28	10	8.1
422438085550001 - MUSKRAT LAKE NR GORLES MI (LAT 42 24 38 LONG 085 55 00)											
AUG , 1982											
30...	1530	200	8.8	22.5	8.9	101	110	15	24	13	5.3

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS LAKES

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	SULFATE DIS-SOLVED (MG/L AS SO4)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)
421500086112801 - VAN AIKEN LAKE NEAR MCDONALD, MI (LAT 42 15 00 LONG 086 11 28)											
SEP , 1982 01...	17	.5	1.7	115	25	17	.1	1.6	204	174	.28
421818086101501 - MERRIMANS LAKE NR BRADFORD MI (LAT 42 18 18 LONG 086 10 15)											
SEP , 1982 01...	9	.3	1.1	140	12	18	.1	5.3	208	192	.28
421915085483001 - FISH LAKE NEAR GOBLES MI (LAT 42 19 15 LONG 085 48 30)											
AUG , 1982 24...	6	.2	.3	171	8.8	9.0	.1	9.8	205	195	.28
422038086010201 - UPPER JEPHTHA LAKE NEAR BREEDSVILLE, MI (LAT 42 20 38 LONG 086 01 02)											
SEP , 1982 02...	6	.2	1.0	149	8.9	19	.1	5.0	214	186	.29
422158085592701 - GREAT BEAR LAKE NEAR BLOOMINGDALE, MI (LAT 42 21 58 LONG 085 59 27)											
AUG , 1982 12...	16	.5	1.7	134	23	13	.1	4.1	218	190	.29
422330086031001 - SADDLE LAKE NEAR GRAND JUNCTION, MI (LAT 42 23 30 LONG 086 03 10)											
AUG , 1982 12...	14	.4	.1	90	12	9.0	.1	2.1	162	129	.22
422438085550001 - MUSKRAT LAKE NR GOBLES MI (LAT 42 24 38 LONG 085 55 00)											
AUG , 1982 30...	9	.2	1.4	94	10	8.0	.1	1.1	133	122	.18

STREAMS TRIBUTARY TO LAKE MICHIGAN

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	LITHIUM DISSOLVED (UG/L AS LI)	STRONTIUM, DISSOLVED (UG/L AS SR)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C)
421500086112801 - VAN AUKEN LAKE NEAR MCDONALD, MI (LAT 42 15 00 LONG 086 11 28)											
SEP , 1982											
01...	<.010	<.10	.020	.78	.80	.030	<.010	5	150	7.6	--
421818086101501 - MERRIMANS LAKE NR BRADFORD MI (LAT 42 18 18 LONG 086 10 15)											
SEP , 1982											
01...	<.010	<.10	.020	.88	.90	.020	<.010	5	110	11	.4
421915085483001 - FISH LAKE NEAR GARLES MI (LAT 42 19 15 LONG 085 48 30)											
AUG , 1982											
24...	<.010	<.10	<.010	.30	.30	.020	<.010	4	76	3.6	--
422038086010201 - UPPER JEPHTHA LAKE NEAR BREEDSVILLE, MI (LAT 42 20 38 LONG 086 01 02)											
SEP , 1982											
02...	<.010	<.10	<.010	.50	.50	.030	<.010	4	73	6.3	.7
422158085592701 - GREAT BEAR LAKE NEAR BLOOMINGDALE, MI (LAT 42 21 58 LONG 085 59 27)											
AUG , 1982											
12...	<.010	<.10	.010	.59	.60	.030	.030	<4	110	7.7	--
422330086031001 - SADDLE LAKE NEAR GRAND JUNCTION, MI (LAT 42 23 30 LONG 086 03 10)											
AUG , 1982											
12...	<.010	<.10	.040	.56	.60	.060	.020	<4	130	7.8	--
422438085550001 - MUSKRAT LAKE NR GARLES MI (LAT 42 24 38 LONG 085 55 00)											
AUG , 1982											
30...	<.010	<.10	.020	5.6	5.60	.020	<.010	<4	60	5.7	--

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	TURBIDITY (FTU)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)
420437085513801 - GRAVEL LAKE NR MARCELLUS MI (LAT 42 04 37 LONG 085 51 38)											
AUG , 1982											
25...	1000	220	8.4	22.5	10	1.4	8.1	92	130	11	30
420456086122001 - ROUND LAKE AT SISTER LAKES MI (LAT 42 04 56 LONG 086 12 20)											
AUG , 1982											
31...	1330	65	8.3	22.0	14	1.3	8.8	99	38	5.0	10
420650085480001 - BANKSON LAKE NR LAWTON MI (LAT 42 06 50 LONG 085 48 00)											
AUG , 1982											
31...	0900	145	8.3	21.5	11	1.5	7.0	78	91	10	22
420958085582101 - EAGLE LAKE NR DECATUR MI (LAT 42 09 58 LONG 085 58 21)											
AUG , 1982											
25...	1500	165	9.0	27.0	10	1.4	9.2	114	100	11	22
421110085571401 - THREE MILE LAKE NR PAW PAW MI (LAT 42 11 10 LONG 085 57 14)											
AUG , 1982											
31...	1130	78	7.9	22.0	20	--	6.2	70	47	12	12
421112086061201 - SHAFFER LAKE NR LAWRENCE MI (LAT 42 11 12 LONG 086 06 12)											
AUG , 1982											
31...	1700	230	8.7	22.5	7	1.0	8.0	91	130	17	20
421412086121501 - RUSH LAKE NR TOQUIN MI (LAT 42 14 12 LONG 086 12 15)											
AUG , 1982											
12...	1530	255	8.8	25.0	8	1.0	10.4	120	140	22	25
421415085543901 - BROWNWOOD LAKE NR PAW PAW MI (LAT 42 14 15 LONG 085 54 39)											
AUG , 1982											
30...	1130	200	8.5	22.0	13	<1.0	5.8	65	120	18	38

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS LAKES

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	SULFATE DIS-SOLVED (MG/L AS SO4)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)
420437085513801 - GRAVEL LAKE NR MARCELLUS MI (LAT 42 04 37 LONG 085 51 38)											
AUG , 1982											
25...	14	3.4	5	.1	.6	122	5.1	10	.1	5.8	147
420456086122001 - ROUND LAKE AT SISTER LAKES MI (LAT 42 04 56 LONG 086 12 20)											
AUG , 1982											
31...	3.2	2.2	--	.2	<.1	33	3.5	5.0	.1	.3	66
420650085480001 - RANKSON LAKE NR LAWTON MI (LAT 42 06 50 LONG 085 48 00)											
AUG , 1982											
31...	8.7	2.0	--	.1	<.1	81	4.8	5.0	<.1	.5	102
420958085582101 - EAGLE LAKE NR DECATUR MI (LAT 42 09 58 LONG 085 58 21)											
AUG , 1982											
25...	11	2.3	5	.1	.7	89	5.3	11	.2	.6	139
421110085571401 - THREE MILE LAKE NR PAW PAW MI (LAT 42 11 10 LONG 085 57 14)											
AUG , 1982											
31...	4.2	1.5	6	.1	.4	35	4.4	7.0	<.1	.3	60
421112086061201 - SHAFFER LAKE NR LAWRENCE MI (LAT 42 11 12 LONG 086 06 12)											
AUG , 1982											
31...	14	6.5	10	.3	1.3	113	9.8	16	.1	1.1	127
421412086121501 - RUSH LAKE NR TOQUIN MI (LAT 42 14 12 LONG 086 12 15)											
AUG , 1982											
12...	18	3.9	6	.2	.8	115	4.4	21	.1	5.0	167
421415085543901 - BROWNWOOD LAKE NR PAW PAW MI (LAT 42 14 15 LONG 085 54 39)											
AUG , 1982											
30...	11	4.3	7	.2	.5	102	7.6	12	<.1	2.6	143

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS LAKES

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)	ALUM-INUM, TOTAL RECOV-ERABLE (UG/L AS AL)	ARSENIC TOTAL (UG/L AS AS)
420437085513801 - GRAVEL LAKE NR MARCELLUS MI (LAT 42 04 37 LONG 085 51 38)											
AUG , 1982 25...	142	.20	<.010	<.10	<.010	--	<.10	.050	<.010	30	3
420456086122001 - ROUND LAKE AT SISTER LAKES MI (LAT 42 04 56 LONG 086 12 20)											
AUG , 1982 31...	44	.09	<.010	<.10	<.010	2.8	2.80	.020	<.010	60	1
420650085480001 - RANKSON LAKE NR LAWTON MI (LAT 42 06 50 LONG 085 48 00)											
AUG , 1982 31...	92	.14	<.010	2.3	.010	.59	.60	.020	<.010	50	2
420958085582101 - EAGLE LAKE NR DECATUR MI (LAT 42 09 58 LONG 085 58 21)											
AUG , 1982 25...	107	.19	<.010	<.10	<.010	.30	.30	<.010	<.010	40	1
421110085571401 - THREE MILE LAKE NR PAW PAW MI (LAT 42 11 10 LONG 085 57 14)											
AUG , 1982 31...	51	.08	<.010	<.10	.010	.80	.90	.010	<.010	50	1
421112086061201 - SHAFFER LAKE NR LAWRENCE MI (LAT 42 11 12 LONG 086 06 12)											
AUG , 1982 31...	146	.17	<.010	<.10	<.010	.50	.50	.020	<.010	40	1
421412086121501 - RUSH LAKE NR TODUIN MI (LAT 42 14 12 LONG 086 12 15)											
AUG , 1982 12...	147	.23	<.010	<.10	.020	1.5	1.50	.020	.020	30	1
421415085543901 - BROWNWOOD LAKE NR PAW PAW MI (LAT 42 14 15 LONG 085 54 39)											
AUG , 1982 30...	129	.19	<.010	<.10	<.010	3.0	3.00	.020	<.010	40	1

DATE	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BORON, TOTAL RECOV-ERABLE (UG/L AS B)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)
420437085513801 - GRAVEL LAKE NR MARCELLUS MI (LAT 42 04 37 LONG 085 51 38)											
AUG , 1982											
25...	<100	50	20	2	6	100	10	4	30	1	5
420456086122001 - ROUND LAKE AT SISTER LAKES MI (LAT 42 04 56 LONG 086 12 20)											
AUG , 1982											
31...	<100	50	10	2	13	130	11	5	20	1	3
420650085480001 - RANKSON LAKE NR LAWTON MI (LAT 42 06 50 LONG 085 48 00)											
AUG , 1982											
31...	<100	40	10	2	7	100	4	1	30	1	3
420958085582101 - EAGLE LAKE NR DECATUR MI (LAT 42 09 58 LONG 085 58 21)											
AUG , 1982											
25...	100	50	10	5	6	50	17	3	10	5	2
421110085571401 - THREE MILE LAKE NR PAW PAW MI (LAT 42 11 10 LONG 085 57 14)											
AUG , 1982											
31...	<100	50	10	2	7	90	13	2	10	1	1
421112086061201 - SHAFFER LAKE NR LAWRENCE MI (LAT 42 11 12 LONG 086 06 12)											
AUG , 1982											
31...	100	40	20	1	3	120	<3	3	10	<1	2
421412086121501 - RUSH LAKE NR TOQUIN MI (LAT 42 14 12 LONG 086 12 15)											
AUG , 1982											
12...	100	40	10	<1	5	80	<3	4	40	2	6
421415085543901 - BROWNWOOD LAKE NR PAW PAW MI (LAT 42 14 15 LONG 085 54 39)											
AUG , 1982											
30...	100	60	10	1	4	40	<3	3	40	<1	1

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS LAKES

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	STRON-TIUM, TOTAL RECOV-ERABLE (UG/L AS SR)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)	AME-TRYNE TOTAL	ATRA-TONE TOTAL (UG/L)	ATRA-ZINE, TOTAL (UG/L)	CYAN-AZINE TOTAL (UG/L)	CYPRA-ZINE TOTAL (UG/L)
420437085513801 - GRAVEL LAKE NR MARCELLUS MI (LAT 42 04 37 LONG 085 51 38)											
AUG , 1982 25...	40	50	3.7	--	--	<1	<.10	<.10	<.10	<.10	<.10
420456086122001 - ROUND LAKE AT SISTER LAKES MI (LAT 42 04 56 LONG 086 12 20)											
AUG , 1982 31...	20	20	4.7	--	<.01	<1	<.10	<.10	<.10	<.10	<.10
420650085480001 - RANKSON LAKE NR LAWTON MI (LAT 42 06 50 LONG 085 48 00)											
AUG , 1982 31...	30	30	6.1	--	<.01	1	<.10	<.10	<.10	<.10	<.10
420958085582101 - EAGLE LAKE NR DECATUR MI (LAT 42 09 58 LONG 085 58 21)											
AUG , 1982 25...	30	20	5.1	--	<.01	<1	<.10	<.10	<.10	<.10	<.10
421110085571401 - THREE MILE LAKE NR PAW PAW MI (LAT 42 11 10 LONG 085 57 14)											
AUG , 1982 31...	20	30	9.1	.4	<.01	<1	<.10	<.10	.10	<.10	<.10
421112086061201 - SHAFFER LAKE NR LAWRENCE MI (LAT 42 11 12 LONG 086 06 12)											
AUG , 1982 31...	50	10	5.2	--	<.01	<1	<.10	<.10	.20	<.10	<.10
421412086121501 - RUSH LAKE NR TOQUIN MI (LAT 42 14 12 LONG 086 12 15)											
AUG , 1982 12...	70	30	6.9	--	<.01	<1	<.10	<.10	<.10	<.10	<.10
421415085543901 - BROWNWOOD LAKE NR PAW PAW MI (LAT 42 14 15 LONG 085 54 39)											
AUG , 1982 30...	60	20	6.0	--	<.01	<1	<.10	<.10	<.10	<.10	<.10

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	PRO-PAZINE TOTAL (UG/L)	PROME-TONE TOTAL (UG/L)	PROME-TRYNE TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	SIMA-ZINE TOTAL (UG/L)	SIME-TONE TOTAL (UG/L)	SIME-TRYNE TOTAL (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
420437085513801 - GRAVEL LAKE NR MARCELLUS MI (LAT 42 04 37 LONG 085 51 38)										
AUG , 1982 25...	<.10	<.1	<.1	<.01	.10	<.10	<.1	.08	<.01	<.01
420456086122001 - ROUND LAKE AT SISTER LAKES MI (LAT 42 04 56 LONG 086 12 20)										
AUG , 1982 31...	<.10	<.1	<.1	<.01	<.10	<.10	<.1	<.01	<.01	<.01
420650085480001 - RANKSON LAKE NR LAWTON MI (LAT 42 06 50 LONG 085 48 00)										
AUG , 1982 31...	<.10	<.1	<.1	<.01	<.10	<.10	<.1	.12	<.01	<.01
420958085582101 - EAGLE LAKE NR DECATUR MI (LAT 42 09 58 LONG 085 58 21)										
AUG , 1982 25...	<.10	<.1	<.1	.01	<.10	<.10	<.1	.07	<.01	<.01
421110085571401 - THREE MILE LAKE NR PAW PAW MI (LAT 42 11 10 LONG 085 57 14)										
AUG , 1982 31...	<.10	<.1	<.1	<.01	<.10	<.10	<.1	.02	<.01	<.01
421112086061201 - SHAFFER LAKE NR LAWRENCE MI (LAT 42 11 12 LONG 086 06 12)										
AUG , 1982 31...	<.10	<.1	<.1	<.01	<.10	<.10	<.1	.04	<.01	<.01
421412086121501 - RUSH LAKE NR TOQUIN MI (LAT 42 14 12 LONG 086 12 15)										
AUG , 1982 12...	<.10	<.1	<.1	<.01	.10	<.10	<.1	.63	<.01	<.01
421415085543901 - BROWNWOOD LAKE NR PAW PAW MI (LAT 42 14 15 LONG 085 54 39)										
AUG , 1982 30...	<.10	<.1	<.1	<.01	<.10	<.10	<.1	.16	<.01	<.01

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS LAKES

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	TIME	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	TURBIDITY (FTU)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)
421716086103001 - SCHOOL SECTION LAKE NEAR BANGOR MI (LAT 42 17 16 LONG 086 10 30)											
SEP , 1982											
02...	1400	245	8.9	23.0	69	4.1	9.8	113	130	17	32
421740085565001 - SCHOOL SECTION LAKE GLENDALE MI (LAT 42 17 40 LONG 085 56 50)											
SEP , 1982											
01...	1430	215	8.1	22.0	18	1.9	6.6	75	120	11	31
421920086003001 - NORTH SCOTT LAKE NEAR BANGOR, MI (LAT 42 19 20 LONG 086 00 30)											
AUG , 1982											
12...	1000	265	8.0	22.0	15	1.5	5.0	46	140	12	32
422055085512901 - BRANDYWINE LAKE NR GORLES MI (LAT 42 20 55 LONG 085 51 29)											
AUG , 1982											
30...	1330	52	7.8	21.5	150	6.5	6.6	73	34	11	8.8
422240085541801 - MILL LAKE NEAR GORLES MI (LAT 42 22 40 LONG 085 54 18)											
AUG , 1982											
24...	1230	145	7.6	22.0	15	<1.0	4.8	55	72	15	18
422320086033301 - SILVER LAKE NR GRAND JUNCTION MI (LAT 42 23 20 LONG 086 03 33)											
SEP , 1982											
01...	0930	135	7.8	22.0	33	1.0	6.1	88	64	19	17
422455085490401 - CLEAR LAKE NR KENDALL MI (LAT 42 24 55 LONG 085 49 04)											
SEP , 1982											
02...	0830	265	7.8	20.0	39	1.2	5.8	63	150	8.0	40

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	SULFATE DIS-SOLVED (MG/L AS SO4)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)
421716086103001 - SCHOOL SECTION LAKE NEAR BANGOR MI (LAT 42 17 16 LONG 086 10 30)											
SEP , 1982											
02...	11	11	16	.5	.6	108	20	10	.1	6.6	217
421740085565001 - SCHOOL SECTION LAKE GLENDALE MI (LAT 42 17 40 LONG 085 56 50)											
SEP , 1982											
01...	11	4.2	7	.2	1.8	117	7.0	9.0	.1	2.7	123
421920086003001 - NORTH SCOTT LAKE NEAR BANGOR, MI (LAT 42 19 20 LONG 086 00 30)											
AUG , 1982											
12...	14	4.5	7	.2	1.4	126	6.3	14	.1	2.2	162
422055085512901 - BRANDYWINE LAKE NR GOBLES MI (LAT 42 20 55 LONG 085 51 29)											
AUG , 1982											
30...	3.0	2.6	14	.2	.4	23	5.6	4.0	<.1	1.3	86
422240085541801 - MILL LAKE NEAR GOBLES MI (LAT 42 22 40 LONG 085 54 18)											
AUG , 1982											
24...	6.5	6.8	17	.4	.7	57	16	8.0	.1	.3	103
422320086033301 - SILVER LAKE NR GRAND JUNCTION MI (LAT 42 23 20 LONG 086 03 33)											
SEP , 1982											
01...	5.3	7.0	19	.4	1.1	45	11	15	.1	.7	100
422455085490401 - CLEAR LAKE NR KENDALL MI (LAT 42 24 55 LONG 085 49 04)											
SEP , 1982											
02...	13	2.5	3	.1	.4	145	6.4	14	.1	2.4	190

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS LAKES

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)	ALUM-INUM, TOTAL RECOV-ERABLE (UG/L AS AL)	ARSENIC TOTAL (UG/L AS AS)
421716086103801 - SCHOOL SECTION LAKE NEAR BANGOR MI (LAT 42 17 16 LONG 086 10 38)											
SEP , 1982											
02...	156	.30	<.010	<.10	<.010	1.4	1.40	.050	<.010	40	3
421740085565001 - SCHOOL SECTION LAKE GLENDALE MI (LAT 42 17 40 LONG 085 56 50)											
SEP , 1982											
01...	134	.17	<.010	<.10	<.010	.70	.70	.030	<.010	30	1
421920086003801 - NORTH SCOTT LAKE NEAR BANGOR, MI (LAT 42 19 20 LONG 086 00 38)											
AUG , 1982											
12...	150	.22	<.010	<.10	.020	.88	.90	.020	.020	10	1
422055085512901 - BRANDYWINE LAKE NR GOBLES MI (LAT 42 20 55 LONG 085 51 29)											
AUG , 1982											
30...	40	.12	.010	<.10	.020	20	20.0	.030	<.010	110	2
422240085541801 - MILL LAKE NEAR GOBLES MI (LAT 42 22 40 LONG 085 54 18)											
AUG , 1982											
24...	91	.14	<.010	<.10	.020	.98	1.00	.020	.010	30	1
422320086033301 - SILVER LAKE NR GRAND JUNCTION MI (LAT 42 23 20 LONG 086 03 33)											
SEP , 1982											
01...	84	.14	<.010	<.10	<.010	.60	.60	.020	<.010	30	1
422455085490401 - CLEAR LAKE NR KENDALL MI (LAT 42 24 55 LONG 085 49 04)											
SEP , 1982											
02...	166	.26	<.010	<.10	<.010	.70	.70	.020	<.010	80	1

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BORON, TOTAL RECOV-ERABLE (UG/L AS B)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)
421716086103001 - SCHOOL SECTION LAKE NEAR BANGOR MI (LAT 42 17 16 LONG 086 10 30)											
SEP , 1982											
02...	<100	110	20	1	2	100	28	5	70	6	3
421740085565001 - SCHOOL SECTION LAKE GLENDALE MI (LAT 42 17 40 LONG 085 56 50)											
SEP , 1982											
01...	<100	50	20	1	3	110	14	2	30	14	2
421920086003001 - NORTH SCOTT LAKE NEAR BANGOR, MI (LAT 42 19 20 LONG 086 00 30)											
AUG , 1982											
12...	100	40	10	<1	7	80	<3	3	40	11	6
422055085512901 - BRANDYWINE LAKE NR GORLES MI (LAT 42 20 55 LONG 085 51 29)											
AUG , 1982											
30...	100	130	10	2	4	670	300	3	230	40	1
422240085541801 - MILL LAKE NEAR GORLES MI (LAT 42 22 40 LONG 085 54 18)											
AUG , 1982											
24...	<100	60	<10	2	6	40	13	4	20	11	8
422320086033301 - SILVER LAKE NR GRAND JUNCTION MI (LAT 42 23 20 LONG 086 03 33)											
SEP , 1982											
01...	<100	70	20	2	3	60	22	3	10	3	1
422455085490401 - CLEAR LAKE NR KENDALL MI (LAT 42 24 55 LONG 085 49 04)											
SEP , 1982											
02...	<100	70	10	1	2	100	42	3	30	7	4

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	STRON-TIUM, TOTAL RECOV-ERABLE (UG/L AS SR)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)	AME-TRYNE TOTAL	ATRA-TONE TOTAL (UG/L)	ATRA-ZINE, TOTAL (UG/L)	CYAN-AZINE TOTAL (UG/L)	CYPRA-ZINE TOTAL (UG/L)
421716086103001 - SCHOOL SECTION LAKE NEAR BANGOR MI (LAT 42 17 16 LONG 086 10 30)											
SEP , 1982 02...	140	10	18	2.0	<.01	2	<.10	<.10	.30	<.10	<.10
421740085565001 - SCHOOL SECTION LAKE GLENDALE MI (LAT 42 17 40 LONG 085 56 50)											
SEP , 1982 01...	70	10	8.2	.5	<.01	<1	<.10	<.10	.40	<.10	<.10
421920086003001 - NORTH SCOTT LAKE NEAR BANGOR, MI (LAT 42 19 20 LONG 086 00 30)											
AUG , 1982 12...	90	10	8.6	--	<.01	<1	<.10	<.10	.10	<.10	<.10
422055085512901 - BRANDYWINE LAKE NR GOBLES MI (LAT 42 20 55 LONG 085 51 29)											
AUG , 1982 30...	30	10	20	--	<.01	5	<.10	<.10	<.10	<.10	<.10
422240085541801 - MILL LAKE NEAR GOBLES MI (LAT 42 22 40 LONG 085 54 18)											
AUG , 1982 24...	40	10	6.1	--	<.01	<1	--	--	--	--	--
422320086033301 - SILVER LAKE NR GRAND JUNCTION MI (LAT 42 23 20 LONG 086 03 33)											
SEP , 1982 01...	40	10	9.6	.3	<.01	5	<.10	<.10	<.10	<.10	<.10
422455085490401 - CLEAR LAKE NR KENDALL MI (LAT 42 24 55 LONG 085 49 04)											
SEP , 1982 02...	70	10	12	--	<.01	3	<.10	<.10	.10	<.10	<.10

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS LAKES

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	PRO-PAZINE TOTAL (UG/L)	PROME-TONE TOTAL (UG/L)	PROME-TRYNE TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	SIMA-ZINE TOTAL (UG/L)	SIME-TONE TOTAL (UG/L)	SIME-TRYNE TOTAL (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
421716086103001 - SCHOOL SECTION LAKE NEAR BANGOR MI (LAT 42 17 16 LONG 086 10 30)										
SEP , 1982										
02...	<.10	<.1	<.1	<.01	1.0	<.10	<.1	<.01	<.01	<.01
421740085565001 - SCHOOL SECTION LAKE GLENDALE MI (LAT 42 17 40 LONG 085 56 50)										
SEP , 1982										
01...	<.10	<.1	<.1	<.01	<.10	<.10	<.1	.05	<.01	<.01
421920086003001 - NORTH SCOTT LAKE NEAR BANGOR, MI (LAT 42 19 20 LONG 086 00 30)										
AUG , 1982										
12...	<.10	<.1	<.1	<.01	3.2	<.10	<.1	.19	<.01	<.01
422055085512901 - BRANDYWINE LAKE NR GOBLES MI (LAT 42 20 55 LONG 085 51 29)										
AUG , 1982										
30...	<.10	<.1	<.1	--	<.10	<.10	<.1	--	--	--
422240085541801 - MILL LAKE NEAR GOBLES MI (LAT 42 22 40 LONG 085 54 18)										
AUG , 1982										
24...	--	--	--	<.01	--	--	--	.16	<.01	<.01
422320086033301 - SILVER LAKE NR GRAND JUNCTION MI (LAT 42 23 20 LONG 086 03 33)										
SEP , 1982										
01...	<.10	<.1	<.1	<.01	.60	<.10	<.1	.15	<.01	<.01
422455085490401 - CLEAR LAKE NR KENDALL MI (LAT 42 24 55 LONG 085 49 04)										
SEP , 1982										
02...	<.10	<.1	<.1	<.01	<.10	<.10	<.1	<.01	<.01	<.01

420303085110201 UNION LAKE, SITE 1, NEAR UNION CITY, MI (LAT 42 03 03 LONG 085 11 02)

DATE	TIME	SAMPLING DEPTH (FEET) (00003)	SPECIFIC CONDUCTANCE (UMHOS) (00095)	TEMPERATURE (DEG C) (00010)	NITROGEN, NITRATE TOTAL (MG/L AS N) (00620)	NITROGEN, NITRITE TOTAL (MG/L AS N) (00615)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS TOTAL (MG/L AS PO4) (71886)
SEP 03...	1200	2.00	484	20.5	.58	.020	.60	.060	.070	.21

DATE	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI) (01067)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)
SEP 03...	.020	<1	10	<10	380	4	60	<100	60

420303085110202 UNION LAKE, SITE 2, NEAR UNION CITY, MI (LAT 42 03 03 LONG 085 11 12)

DATE	TIME	SAMPLING DEPTH (FEET) (00003)	SPECIFIC CONDUCTANCE (UMHOS) (00095)	TEMPERATURE (DEG C) (00010)	NITROGEN, NITRATE TOTAL (MG/L AS N) (00620)	NITROGEN, NITRITE TOTAL (MG/L AS N) (00615)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS TOTAL (MG/L AS PO4) (71886)
SEP 03...	1210	6.00	473	20.5	.58	.020	.60	.040	.080	.25

DATE	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI) (01067)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)
SEP 03...	.030	<1	10	10	380	3	60	<100	30

420348085092901 UNION LAKE INLET NEAR UNION CITY, MI (LAT 42 03 48 LONG 085 09 29)

DATE	TIME	SPECIFIC CONDUCTANCE (UMHOS)	TEMPERATURE (DEG C)	NITROGEN, NITRATE TOTAL (MG/L AS N)	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)
SEP 03...	1130	534	18.0	1.4	.010	1.4	.030	.070	.21

DATE	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)
SEP 03...	.020	1	10	10	400	4	70	<100	20

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS LAKES

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

420658086002201 - LAKE OF THE WOODS NEAR DECATUR, MI (LAT 42 06 58 LONG 086 00 22)

DATE	TIME	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM
AUG 25...	1200	300	8.3	21.5	5.6	62	180	31	41	18	5.3	6

DATE	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)	CHLORIDE, DISSOLVED (MG/L AS CL)	SULFATE DISSOLVED (MG/L AS SO4)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)
AUG 25...	.2	1.1	146	9.0	27	.1	7.1	227	196	.31	<.010	<.10

DATE	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	LITHIUM DISSOLVED (UG/L AS LI)	STRONTIUM, DISSOLVED (UG/L AS SR)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C)	PCB, DISSOLVED (UG/L)	PCN DISSOLV (UG/L)
AUG 25...	<.010	1.0	1.00	.040	<.010	4	83	6.5	1.0	<.1	<.10

DATE	ALDRIN, DISSOLVED (UG/L)	CHLORDANE, DISSOLVED (UG/L)	DDD, DISSOLVED (UG/L)	DDE, DISSOLVED (UG/L)	DDT, DISSOLVED (UG/L)	DIAZINON, DISSOLVED (UG/L)	DIELDRIN DISSOLVED (UG/L)	ENDOSULFAN DISSOLV (UG/L)	ENDRIN, DISSOLVED (UG/L)	ETHION DISSOLV (UG/L)	HEPTACHLOR, DISSOLVED (UG/L)
AUG 25...	<.01	<.10	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01

DATE	HEPTACHLOR EPOXIDE DISSOLVED (UG/L)	LINDANE DISSOLVED (UG/L)	MALATHION, DISSOLVED (UG/L)	METHOXYCHLOR DISSOLV (UG/L)	METHYL PARATHION, DISSOLVED (UG/L)	METHYLTRITHION DISSOLV (UG/L)	MIREX, DISSOLVED (UG/L)	PARATHION, DISSOLVED (UG/L)	PERTHANE DISSOLV (UG/L)	TOXAPHENE, DISSOLVED (UG/L)	TRITHION DISSOLV (UG/L)
AUG 25...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.10	<1.0	<.01

FIGURE 9.--Map showing location of observation wells published in this report.

ALGER COUNTY

461608086373801. Local number, 45N 19W 25BDDB.
LOCATION.--Lat 46°16'08", long 086°37'38", Hydrologic Unit 04060106, 250 ft (76 m) northwest of highway M-44, 0.2 mi (0.3 km) northeast of Kentucky.
Owner: U.S. Forest Service.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 66 ft (20 m).
DATUM.--Altitude of land-surface datum is 850 ft (259 m). Measuring point: Top of casing, 3.60 ft (1.10 m) above land-surface datum.
PERIOD OF RECORD.--June 1959 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 6.35 ft (1.94 m) below land-surface datum, June 29, 1960; lowest measured, 14.19 ft (4.33 m) Apr. 3, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 8	11.54	FEB 4	11.85	APR 9	11.95	MAY 25	10.59	JUL 28	10.83

ALPENA COUNTY

450850083393401. Local number, 32N 6E 23DDDA.
LOCATION.--Lat 45°08'50", long 083°39'34", Hydrologic Unit 04070006, on Graham Road, 3 mi (5 km) east and 1.5 mi (2.4 km) north of Long Rapids.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table observation well, diameter 6 in (15 cm), depth 88 ft (27 m), screened 79 to 88 ft (24 to 27 m).
DATUM.--Altitude of land-surface datum is 713 ft (217 m). Measuring point: Plywood instrument shelf, 217 ft (0.8 m) above land-surface.
REMARKS.--Bottom of hole near top of bedrock.
PERIOD OF RECORD.--November 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 15.75 ft (4.80 m) below land-surface datum, May 8, 1979; lowest, 30.01 ft (9.15 m) Mar. 27, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	25.76	26.25	27.07	27.95	28.85	29.54	29.52	24.64	22.29	21.53	23.10	24.82
10	25.77	26.47	27.12	28.06	28.97	29.64	29.13	24.14	22.11	21.63	23.33	24.84
15	25.82	26.61	27.23	28.23	29.12	29.75	28.61	23.65	21.86	21.90	23.69	25.07
20	25.93	26.79	27.40	28.46	29.19	29.86	27.67	23.12	21.65	22.12	24.12	--
25	25.99	26.97	27.59	28.55	29.36	29.98	26.43	22.84	21.57	22.48	24.28	--
EOM	26.17	26.99	27.77	28.71	29.43	29.93	25.43	22.57	21.54	22.89	24.61	--

WTR YEAR 1982 MAX 21.38 JUL 3, 1982 MIN 30.01 MAR 27, 1982

ARENAC COUNTY

440342083542801. Local number, 19N 5E 7DABA1.
LOCATION.--Lat 44°03'42", long 083°54'28", Hydrologic Unit 04080101, 3 mi (5 km) northeast of Omer.
Owner: U.S. Geological Survey.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 185 ft (56 m), screened 180 to 185 ft (55 to 56 m).
DATUM.--Altitude of land-surface datum is 667 ft (203 m). Measuring point: Top of casing, 2.00 ft (0.61 m) above land-surface datum.
PERIOD OF RECORD.--June 1980 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 8.28 ft (2.52 m) below land-surface datum, July 15, 1980; lowest measured, 10.09 ft (3.07 m) Nov. 12, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 4	9.72	JAN 7	9.36	MAR 4	9.12	JUN 23	9.37	AUG 12	9.42	SEP 13	9.62
DEC 4	9.39	FEB 17	9.26	MAY 5	9.34						

ARENAC COUNTY

440342083542802. Local number, 19N 5E 7DABA2.
LOCATION.--Lat 44°03'42", long 083°54'28", Hydrologic Unit 04080101, 3 mi (5 km) northeast of Omer.
Owner: U.S. Geological Survey
AQUIFER.--Lake bed sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 21 ft (6 m), screened 16 to 21 ft (5 to 6 m).
DATUM.--Altitude of land-surface datum is 667 ft (203 m). Measuring point: Top of casing, 2.2 ft (0.67 m) above land-surface datum.
PERIOD OF RECORD.--June 1980 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.90 ft (0.88 m) below land-surface datum, June 23, 1982; lowest measured, 6.92 ft (2.11 m) Aug. 21, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 4	5.28	JAN 7	4.95	MAR 4	6.50	JUN 23	2.90	AUG 12	4.14	SEP 13	5.18
DEC 4	4.90	FEB 17	5.42	MAY 5	3.69						

BARAGA COUNTY

463353088144301. Local number, 48N 32W 12DDCC.
LOCATION.--Lat 46°33'53", long 088°14'43", Hydrologic Unit 04030107, 95 ft (29 m) north of U.S. Highway 41 and 0.5 mi (0.8 km) southeast of Nestoria Road.
Owner: Michigan State Highway Department.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 1¼ in (3.2 cm), depth 10 ft (3 m), screened 7 to 10 ft (2 to 3 m).
DATUM.--Altitude of land-surface datum is 1,630 ft (497 m). Measuring point: Top of casing, 4.78 ft (1.46 m) above land-surface datum.
REMARKS.--Measurements made by Wisconsin-Michigan Power Company.
PERIOD OF RECORD.--September 1948 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.27 ft (1.00 m) below land-surface datum, Apr. 30, 1965; lowest measured, 8.09 ft (2.47 m) Sept. 2, 1960.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	6.73	DEC 31	7.39	FEB 28	7.50	APR 30	5.23	JUN 30	6.96	AUG 31	6.31
NOV 30	7.11	JAN 31	7.33	MAR 31	7.23	MAY 31	6.67	JUL 31	6.65	SEP 30	6.01

BARRY COUNTY

424540085232001. Local number, 4N 9W 5DAAA.
LOCATION.--Lat 42°45'40", long 085°23'20", Hydrologic Unit 04050007, on Solomon Road 4 mi (6 km) east and 3.5 mi (5.6 km) north of Middleville.
Owner: State Department of Natural Resources.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 2 in (5 cm), depth 131 ft (40 m).
DATUM.--Altitude of land-surface datum is 860 ft (262 m). Measuring point: Top of casing, 2 ft (1 m) above land-surface datum.
PERIOD OF RECORD.--December 1964 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 111.5 ft (34.0 m) below land-surface datum, Mar. 20, 1978; lowest measured, 122.0 ft (37.2 m) Mar. 5, 1965.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	116.2	JAN 7	116.4	JUN 1	116.2	AUG 24	116.1

BAY COUNTY

435128083582401. Local number, 17N 4E 22DCAA.
LOCATION.--Lat 43°51'28", long 083°58'24", Hydrologic Unit 04080102, at end of Second Street, Pinconning.
Owner: Pinconning Township.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 110 ft (33 m), cased to 60 ft (18 m), open end.
DATUM.--Altitude of land-surface datum is 620 ft (189 m). Measuring point: Plywood shelter base, 2.00 ft (0.61 m) above land-surface datum.
REMARKS.--Water levels affected by regional pumping.
PERIOD OF RECORD.--August 1962 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.05 ft (0.02 m) below land-surface datum, Mar. 5, 1976; lowest, 10.53 ft (3.21 m) Aug. 8, 1963.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 21	2.28	JAN 13	1.53	MAR 2	1.35	JUN 23	2.26	AUG 10	2.74	SEP 13	3.30
DEC 4	1.55										

BRANCH COUNTY

415602084593701. Local number, 6S 6W 22CABA.
LOCATION.--Lat 41°56'02", long 084°59'37", Hydrologic Unit 04050001, at Bennett and Tibbits Streets, Coldwater.
Owner: City of Coldwater.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 113 ft (34 m), screened 73 to 113 ft (22 to 34 m).
DATUM.--Altitude of land-surface datum is 970 ft (296 m). Measuring point: Plywood shelter base, 2.50 ft (0.76 m) above land-surface datum.
REMARKS.--Water levels affected by nearby pumping.
PERIOD OF RECORD.--January 1964 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 9.0 ft (2.7 m) below land-surface datum, May 6, 1975; lowest, 25.9 ft (7.9 m) May 25, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	19.4	19.9	13.8	18.6	--	12.9	--	18.6	13.4	12.1	22.6	13.7
10	19.4	16.4	14.4	12.8	--	--	--	20.6	20.2	19.6	21.8	15.0
15	19.7	13.1	13.3	20.2	--	--	18.9	20.2	19.6	18.8	12.6	23.0
20	20.8	20.0	12.7	20.7	--	--	18.7	19.4	9.2	19.7	22.0	22.9
25	12.1	16.6	19.0	--	--	--	18.6	18.7	16.5	20.4	20.4	14.6
EOM	13.1	20.7	13.7	--	--	--	18.5	16.2	19.5	17.5	17.1	22.1

WTR YEAR 1982 MAX 9.0 MAY 25, 1982 MIN 23.0 SEP 15, 1982

CALHOUN COUNTY

422422085071501. Local number, 1S 7W 10BBAB.
LOCATION.--Lat 42°24'22", long 085°07'15", Hydrologic Unit 04050003, at highways M-78 and M-66, 5 mi (8 km) north of Battle Creek.
Owner: Rilla Sabin.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Dug water-table well, diameter 15 in (38 cm), depth 12 ft (4 m), open tile bottom.
DATUM.--Land-surface datum is 907.99 ft (276.76 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 1.50 ft (0.46 m) above land-surface datum.
REMARKS.--Measured by observer.
PERIOD OF RECORD.--September 1946 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.89 ft (0.27 m) below land-surface datum, Mar. 28, 1950; lowest, dry, July 29, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	3.84	DEC 2	3.95	FEB 3	4.30	APR 14	2.70	JUN 9	3.20	AUG 4	3.74
14	3.82	9	4.04	10	4.42	21	2.64	16	3.14	11	3.82
21	3.90	16	4.12	17	4.40	28	2.61	23	3.30	18	4.00
28	3.94	23	4.20	24	4.45	MAY 5	2.70	30	3.35	25	4.16
NOV 4	3.95	30	4.29	MAR 3	3.90	12	2.90	JUL 7	3.50	SEP 1	4.10
11	3.97	JAN 6	3.80	10	3.56	19	3.10	14	3.48	8	4.13
18	3.99	13	4.16	17	3.42	26	3.06	21	3.64	15	4.26
25	3.96	20	3.90	APR 7	2.68	JUN 2	3.08	28	3.70	22	4.30

CALHOUN COUNTY

422025085084001. Local number, 1S 7W 32DABA.
LOCATION.--Lat 42°20'25", long 085°08'40", Hydrologic Unit 04050003, at Verona well field, Battle Creek.
Owner: City of Battle Creek.
AQUIFER.--Marshall Formation of Mississippian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 8 in (20 cm), depth 127 ft (39 m), cased to 103 ft (31 m).
DATUM.--Land-surface datum is 830.79 ft (253.22 m) National Geodetic Vertical Datum of 1929. Measuring point: Recorder base, 2.10 ft (0.64 m) above land-surface datum.
REMARKS.--Water levels affected by nearby municipal pumping. Measurements made daily by Water Department.
PERIOD OF RECORD.--October 1939 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.7 ft (0.2 m) below land surface datum, Apr. 26-27, 1950; lowest, 16.75 ft (5.11 m) July 16, 1959.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	5.70	8.20	8.10	10.00	11.00	10.90	9.70	11.30	10.60	10.80	13.25	11.20
10	6.10	8.70	8.65	11.10	10.40	10.40	9.10	11.10	11.50	10.70	12.80	13.20
15	7.90	7.20	9.00	11.00	11.00	12.60	10.80	11.30	12.80	12.40	12.90	12.50
20	6.80	9.20	10.00	10.60	10.60	9.60	10.80	11.70	10.60	12.00	12.70	11.30
25	7.85	8.80	9.50	10.30	12.00	10.30	9.40	11.00	11.90	11.30	13.40	11.60
EOM	8.25	7.90	9.15	9.90	12.20	10.00	10.20	10.20	11.90	12.70	13.10	10.10

CASS COUNTY

414651085575601. Local number, 8S 14W 17BAAA.
LOCATION.--Lat 41°46'51", long 085°57'56", Hydrologic Unit 04050001, 2 mi (3 km) east of Adamsville on U.S. Highway 112.
Owner: Ted Little.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Dug water-table well, diameter 28 in (71 cm), depth 55 ft (17 m), cribbed with brick to open bottom.
DATUM.--Altitude of land-surface datum is 840 ft (256 m). Measuring point: Top of wooden platform, 1.00 ft (0.30 m) above land-surface datum.
REMARKS.--Measured by observer.
PERIOD OF RECORD.--September 1945 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 46.20 ft (14.08 m) below land-surface datum, July 16, 1950; lowest, dry, Mar. 10, 1947.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 27	49.10	DEC 24	49.30	FEB 24	49.30	APR 26	49.35	JUN 22	48.80	AUG 25	47.35
NOV 22	49.40	JAN 26	49.45	MAR 23	49.50	MAY 25	49.20	JUL 26	48.50	SEP 25	47.70

CHEBOYGAN COUNTY

454427084424001. Local number, 39N 3W 29CBCB1.
LOCATION.--Lat 45°44'27", long 084°42'40", Hydrologic Unit 04070003, on Stimpson Rd. 3 mi (5 km) southeast of Mackinaw City.
Owner: U.S. Geological Survey
AQUIFER.--Dundee Formation of Devonian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 121 ft (37 m) cased to 104 ft (32 m), open end.
DATUM.--Altitude of land-surface datum is 705 ft (215 m). Measuring point: Top of casing, 2 ft (1 m) above land-surface datum.
PERIOD OF RECORD.--January 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.25 ft (1.60 m) below land-surface datum, May 12, 1979; lowest measured, 11.68 ft (3.56 m) Feb. 11, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 15	11.00	JAN 7	9.62	MAR 30	8.82	JUN 15	7.80	JUL 21	9.60	AUG 31	10.75
NOV 16	10.18	FEB 9	9.96	MAY 4	6.23						

CHEBOYGAN COUNTY

454427084424002. Local number, 39N 3W 29CBCB2.
LOCATION.--Lat 45°44'27", long 084°42'40", Hydrologic Unit 04070003, on Stimpson Rd. 3 mi (5 km) southeast of Mackinaw City.
Owner: U.S. Geological Survey.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 55 ft (17 m), screened 40 to 55 ft (12 to 17 m).
DATUM.--Altitude of land-surface datum is 705 ft (215 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--February 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.07 ft (0.63 m) below land-surface datum, May 12, 1979; lowest measured, 6.47 ft (1.97 m) Feb. 11, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 15	5.70	JAN 7	5.42	MAR 30	4.79	JUN 15	3.63	JUL 21	4.92	AUG 31	5.68
NOV 16	5.33	FEB 9	5.65	MAY 4	2.70						

CHIPPEWA COUNTY

462159084442201. Local number, 46N 4W 24DADA.
LOCATION.--Lat 46°21'59", long 084°44'22", Hydrologic Unit 04020203, on trail 0.2 mi (0.3 km) south of highway M-28 and 1 mi (2 km) west of Raco.
Owner: U.S. Forest Service
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 54 ft (16 m).
DATUM.--Altitude of land-surface datum is 850 ft (259 m). Measuring point: Top of shelter base, 3.07 ft (0.94 m) above land-surface datum.
PERIOD OF RECORD.--June 1952 to April 1965. November 1969 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 18.40 ft (5.61 m) below land-surface datum, June 7, 1971; lowest, 28.43 ft (8.67 m) Apr. 14, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	25.12	25.64	25.97	26.28	26.66	26.99	27.33	25.85	23.78	24.00	24.56	25.02
10	25.20	25.70	26.02	26.34	26.72	27.05	27.39	25.04	23.76	24.08	24.67	25.10
15	25.29	25.74	26.08	26.39	26.77	27.10	27.42	24.45	23.75	24.25	24.74	25.23
20	25.38	25.80	26.13	26.42	26.83	27.15	27.44	24.18	23.78	24.29	24.81	25.27
25	25.46	25.86	26.18	26.49	26.90	27.21	27.36	23.98	23.84	24.36	24.88	25.33
EOM	25.56	25.91	26.23	26.61	26.94	27.28	26.76	23.80	23.90	24.47	24.95	25.40

WTR YEAR 1982 MAX 23.75 JUN 15, 1982 MIN 27.44 APR 19, 1982

CLINTON COUNTY

425410084323501. Local number, 6N 2W 16DDAD.
LOCATION.--Lat 42°54'10", long 084°32'35", Hydrologic Unit 04050005, at U.S. Highway 27, 6 mi (10 km) south of St. Johns.
Owner: State Highway Department.
AQUIFER.--Gravel of Pleistocene age.
WELL CHARACTERISTICS.--Driven observation water-table well, diameter 2 in (51 cm), depth 26 ft (8 m), screened 23 to 26 ft (7 to 8 m).
DATUM.--Land-surface datum is 803.32 ft (244.85 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 1.30 ft (0.40 m) above land-surface datum.
REMARKS.--Federal key well.
PERIOD OF RECORD.--August 1948 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.84 ft (4.22 m) below land-surface datum, Apr. 30, 1974; lowest measured, 19.93 ft (6.07 m) Feb. 27, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 22	18.00	DEC 21	17.77	FEB 22	18.06	APR 23	17.14	JUN 23	17.76	AUG 23	18.26
NOV 23	17.92	JAN 25	17.89	MAR 22	17.47	MAY 21	17.60	JUL 21	17.94	SEP 20	18.31

CRAWFORD COUNTY

443308084245001. Local number, 25N 1W 15DDCD.
LOCATION.--Lat 44°33'08", long 084°24'50", Hydrologic Unit 04070007, 2.6 mi (4.2 km) south of Eldorado on Highway M-18.
Owner: U.S. Forest Service.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 56 ft (17 m), cased.
DATUM.--Altitude of land-surface datum is 1,190 ft (363 m). Measuring point: Top of shelter base, 2.95 ft (0.90 m) above land-surface datum.
PERIOD OF RECORD.--November 1948 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 25.71 ft (7.84 m) below land-surface datum, May 10, 1976; lowest, 35.97 ft (10.96 m) Apr. 4-6, 1951.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	29.78	30.08	30.35	30.68	31.07	31.39	31.75	31.01	29.87	29.86	30.21	30.45
10	29.85	30.18	30.39	30.73	31.09	31.45	31.76	30.73	29.80	29.90	30.23	30.49
15	29.86	30.18	30.43	30.77	31.12	31.51	31.79	30.47	29.78	29.96	30.28	30.54
20	29.97	30.23	30.55	30.90	31.23	31.56	31.76	30.24	29.75	30.03	30.32	30.60
25	30.00	30.30	30.61	30.96	31.32	31.62	31.62	30.10	29.78	30.08	30.36	30.64
EOM	30.05	30.35	30.67	31.00	31.34	31.67	31.34	29.95	29.82	30.14	30.42	30.69

WTR YEAR 1982 MAX 29.69 SEP 1, 1981 MIN 31.79 APR 14, 1982

DELTA COUNTY

454446087090401. Local number, 39N 23W 28ACC.
LOCATION.--Lat 45°44'46", long 087°09'04", Hydrologic Unit 04030111, 3.5 mi (5.6 km) east of Escanaba.
Owner: M. Blake
AQUIFER.--Munising Sandstone of Cambrian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 5 in (13 cm), depth 530 ft (162 m).
DATUM.--Altitude of land-surface datum is 680 ft (207 m). Measuring point: Top of shelter base, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--July 1968 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 1.5 ft (0.5 m) below land-surface datum, May 6, 1960; lowest, 8.9 ft (2.7 m) Feb. 6, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	5.88	5.42	5.45	5.63	--	5.82	--	4.86	5.25	5.54	--	5.82
10	5.83	5.46	5.60	5.67	--	5.93	5.01	4.94	5.34	--	--	5.79
15	--	5.46	5.61	5.67	--	5.69	4.92	4.86	5.13	--	5.69	5.81
20	5.32	5.46	5.62	--	5.80	5.65	4.80	4.86	5.25	--	5.91	5.73
25	5.38	5.51	5.69	--	5.83	5.58	4.81	5.03	5.34	--	5.79	5.70
EOM	5.40	5.44	5.74	--	5.83	--	4.86	5.10	5.48	--	5.79	5.73

WTR YEAR 1982 MAX 4.76 APR 26, 1982 MIN 6.20 OCT 1, 1981

DICKINSON COUNTY

460458087493901. Local number, 43N 28W 32ADAB.
LOCATION.--Lat 46°04'58", long 087°49'39", Hydrologic Unit 04030109, 6.25 mi (10.06 km) north of Felch.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Augered water-table well, diameter, 1¼ in (3.18 cm), depth 31 ft (9 m) screened 29 to 31 ft (8.8 to 9.4 m).
DATUM.--Altitude of land-surface datum is 1,160 ft (353 m). Measuring point: Hole in top of cap, 4.00 ft (1 m) above land-surface datum.
PERIOD OF RECORD.--October 1966 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.10 ft (3.99 m) below land-surface datum, May 17, 1972; lowest measured, 16.50 ft (5.03 m) Mar. 2, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 14	14.77	DEC 16	15.17	FEB 25	15.69	JUN 1	14.25	JUL 29	14.54	SEP 30	14.56
NOV 9	14.94	JAN 28	15.52	APR 1	15.67	30	14.69	SEP 1	14.99		

EATON COUNTY

424435084365001. Local number, 4N 3W 12CDAD.
LOCATION.--Lat 42°44'35", long 084°36'50", Hydrologic Unit 04050004, north of M-43, 0.5 mi (0.8 km) west of Lansing.
Owner: F. Wheeler.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 381 ft (116 m), cased to 140 ft (43 m).
DATUM.--Land-surface datum is 862.91 ft (263.01 m) National Geodetic Vertical Datum of 1929. Measuring point: Plywood instrument shelf, 1.00 ft (0.30 m) above land-surface datum.
REMARKS.--Water levels affected by pumping.
PERIOD OF RECORD.--October 1953 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 67.5 ft (20.6 m) below land-surface datum, Nov. 23, 1953; lowest, 103.6 ft (31.6 m) Aug. 28, 1969.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	85.00	83.14	84.15	90.36	84.39	87.63	83.12	86.32	90.96	87.19	91.54	88.78
10	84.25	82.68	84.15	90.46	83.66	82.19	83.56	88.61	93.01	91.17	89.68	88.03
15	85.87	84.07	83.28	89.59	83.44	80.16	83.60	91.56	91.15	91.69	92.56	89.02
20	85.51	83.80	87.40	90.66	85.99	85.62	81.60	91.40	85.62	93.28	95.85	87.42
25	--	82.76	88.40	88.85	87.91	89.32	80.73	88.96	85.81	93.56	91.18	86.31
EOM	--	82.54	85.80	85.53	88.98	82.29	88.15	90.03	85.96	90.82	88.86	87.61

WTR YEAR 1982 MAX 79.73 APR 26, 1982 MIN 95.85 AUG 20, 1982

GENESEE COUNTY

425552083382801. Local number, 6N 7E 9DCCC.
LOCATION.--Lat 42°55'52", long 083°38'28", Hydrologic Unit 04080204, at Fisher Body Plant, Grand Blanc.
Owner: General Motors Corporation.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 10 in (25 cm), depth 385 ft (117 m), cased to 150 ft (46 m).
DATUM.--Land-surface datum is 837.0 ft (255.1 m) National Geodetic Vertical Datum of 1929. Measuring point: Base for recorder, 1.50 ft (0.46 m) above land-surface datum.
REMARKS.--Water levels affected by nearby pumping. Measurements made by Plant Water Department.
PERIOD OF RECORD.--January 1974 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 52.3 ft (15.9 m) below land-surface datum, Dec. 29, 1975; lowest, 87.0 ft (26.5 m) June 29, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	60.01	59.15	56.45	57.16	56.87	56.57	62.21	57.16	58.95	59.16	64.51	66.64
10	59.30	61.37	56.67	56.48	57.06	56.78	62.36	56.68	59.55	63.74	69.00	67.11
15	58.90	57.92	56.74	56.64	56.68	56.06	59.81	61.16	64.14	65.83	71.97	69.43
20	58.68	56.74	56.78	57.39	55.97	55.88	59.00	62.38	60.64	64.34	73.81	64.80
25	57.85	57.17	56.89	56.40	56.39	56.15	58.77	61.30	59.32	65.84	70.03	63.22
EOM	57.61	57.13	57.50	56.02	56.17	60.88	57.57	60.18	58.90	63.70	67.06	65.15

WTR YEAR 1982 MAX 55.60 FEB 21, 1982 MIN 73.82 AUG 21, 1982

GRAND TRAVERSE COUNTY

443921085213501. Local number, 26N 9W 14ABAA.
LOCATION.--Lat 44°39'21", long 085°21'35", Hydrologic Unit 04060105, 5.5 mi (8.8 km) north of Fife Lake.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 6 in (15 cm), depth 80 ft (24 m), PVC pipe and screen.
DATUM.--Altitude of land-surface datum is 960 ft (293 m). Measuring point: Plywood instrument shelf, 2.85 ft (0.87 m) above land-surface datum.
PERIOD OF RECORD.--June 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 23.32 ft (7.11 m) below land-surface datum, June 17, 1976; lowest, 28.05 ft (8.55 m), Apr. 3, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	27.01	27.27	27.48	27.66	--	27.93	28.05	26.18	25.54	25.75	26.01	26.32
10	27.05	27.30	27.52	27.68	--	27.95	27.95	25.94	25.55	25.79	26.07	26.37
15	27.10	27.34	27.55	27.85	--	27.97	27.74	25.77	25.57	25.85	26.12	26.42
20	27.14	27.38	27.58	27.87	--	27.99	27.54	25.65	25.61	25.89	26.16	26.47
25	27.18	27.41	27.60	27.91	--	28.01	27.05	25.58	25.67	25.93	26.21	26.52
EOM	27.23	27.45	27.64	--	--	28.04	26.55	25.54	25.71	25.97	26.27	26.57

WTR YEAR 1982 MAX 25.53 MAY 31, 1982 MIN 28.05 APR 3, 1982

HILLSDALE COUNTY

415154084315401. Local number, 7S 2W 15BCBA1.
LOCATION.--Lat 41°51'54", long 084°31'54", Hydrologic Unit 04100003, at Trail and Bird Lake Roads 7 mi (11 km) southeast of Hillsdale.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 150 ft (46 m), screened 135 to 150 ft (41 to 46 m).
DATUM.--Altitude of land-surface datum is 1,092 ft (333 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--November 1978 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 46.14 ft (14.06 m) below land-surface datum, Apr. 13, 1982; lowest measured, 49.00 ft (14.93 m) Mar. 15, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 27	47.01	JAN 19	47.34	APR 13	46.14	JUN 22	46.20	AUG 3	46.59	SEP 14	47.04
DEC 8	47.11	MAR 2	47.28	MAY 18	46.29						

HILLSDALE COUNTY

415236084313701. Local number, 7S 2W 10BDDD.
LOCATION.--Lat 41°52'36", long 084°31'37", Hydrologic Unit 04100003, 2.5 mi (4.0 km) west of Pittsford on M-43.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Augered water-table well, diameter 1¼ in (3.2 cm), depth 20 ft (6 m), screened 17 to 20 ft (5 to 6 m).
DATUM.--Altitude of land-surface datum is 1,070 ft (326 m). Measuring point: Top of casing, 4.00 ft (1.22 m) above land-surface datum.
PERIOD OF RECORD.--December 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.79 ft (1.76 m) below land-surface datum, Apr. 13, 1982; lowest measured, 11.1 ft (3.38 m), Sept. 21, 1967.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 27	7.37	JAN 19	7.77	APR 13	5.79	JUN 22	6.27	AUG 3	7.75	SEP 14	8.40
DEC 8	7.68	MAR 2	7.97	MAY 18	6.84						

INGHAM COUNTY

424424084340301. Local number, 4N 2W 17ABAA.
LOCATION.--Lat 42°44'24", long 084°34'03", Hydrologic Unit 04050004, at Kirby and Logan Streets, Lansing.
Owner: City of Lansing.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 20 in (51 cm), depth 424 ft (129 m).
DATUM.--Land-surface datum is 858.72 ft (261.74 m) National Geodetic Vertical Datum of 1929. Measuring point: Plywood shelter base, 0.5 ft (0.2 m) above land-surface datum.
REMARKS.--Water levels affected by regional pumping.
PERIOD OF RECORD.--December 1929 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 34.3 ft (10.5 m) below land-surface datum, Dec., 1929; lowest, 168.3 ft (51.3 m) May 7, 1968.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	114.4	114.9	115.2	114.5	114.5	113.8	113.4	112.8	112.7	112.0	111.4	111.0
10	114.8	115.3	115.1	114.4	113.8	113.9	113.1	112.8	112.7	111.8	111.3	110.8
15	114.9	115.0	114.9	114.4	113.3	113.7	113.1	112.8	112.5	111.9	111.2	110.7
20	114.9	114.7	115.2	114.8	113.3	113.5	113.1	112.7	112.4	111.8	111.3	110.3
25	115.0	115.1	115.0	114.6	114.2	113.4	112.8	112.7	112.5	111.7	111.2	110.1
EOM	115.3	115.1	114.6	114.6	114.1	113.3	113.0	112.4	112.3	111.4	111.2	110.2

WTR YEAR 1982 MAX 109.9 SEP 25, 1982 MIN 115.4 NOV 9, 1981.

IOSCO COUNTY

442839083312301. Local number, 24N 7E 13ADAD1.
LOCATION.--Lat 44°28'39", long 083°31'23", Hydrologic Unit 04070007, 10 mi (16 km) west of Oscoda.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 69 ft (21 m), screened 54 to 69 ft (16 to 21 m).
DATUM.--Altitude of land-surface datum is 760 ft (232 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--June 1980 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 29.67 ft (9.04 m) below land-surface datum, July 14, 1980; lowest measured, 32.71 ft (9.97 m) Mar. 23, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 16	31.64	DEC 20	32.06	FEB 8	32.43	MAY 18	31.79	JUL 20	31.57	SEP 21	31.94
NOV 19	31.89	JAN 19	32.30	MAR 23	32.71						

IRON COUNTY

461257088542001. Local number, 44N 37W 14BBCA.
LOCATION.--Lat 46°12'57", long 088°54'20", Hydrologic Unit 04030106, 0.5 mi (0.8 km) south of Elmwood on FFH 16.
Owner: State Highway Department.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Driven water-table well, diameter 6 in (15 cm), depth 102 ft (31 m).
DATUM.--Altitude of land-surface datum is 1,730 ft (527 m). Measuring point: Top of plywood shelter base, 4.21 ft (1.28 m) above land-surface datum.
PERIOD OF RECORD.--October 1959 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 91.84 ft (27.99 m) below land-surface datum, Oct. 3, 1973; lowest measured, 97.11 ft (29.60 m) Aug. 16, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 26	95.16	MAR 2	93.25	JUN 15	93.00	AUG 16	97.11

JACKSON COUNTY

421346084230801. Local number, 3S 1W 11AADD1.
LOCATION.--Lat 42°13'46", long 084°23'08", Hydrologic Unit 04050004, at Belden and Mansion Street, Jackson.
Owner: City of Jackson.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 16 in (15 cm), depth 360 ft (110 m), open bottom.
DATUM.--Altitude of land-surface datum is 935 ft (285 m). Measuring point: Plywood recorder shelf, 5.50 ft (1.68 m) above land-surface datum.
REMARKS.--Measured by owner; water levels affected by pumping; lowest monthly reading shown.
PERIOD OF RECORD.--June 1957 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 18.6 ft (5.7 m) below land-surface datum, Jan. 2, 1961; lowest measured, 119.1 ft (36.3 m) June 30, 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 9	79.2	DEC 4	76.9	FEB 25	78.8	APR 23	74.0	JUN 11	81.0	AUG 31	91.9
NOV 12	78.8	JAN 28	76.6	MAR 4	76.1	MAY 20	91.6	JUL 16	91.7	SEP 1	87.6

KALAMAZOO COUNTY

421641085350601. Local number, 2S 11W 22CDBB.
LOCATION.--Lat 42°16'41", long 085°35'06", Hydrologic Unit 04050003, at southwest corner Crosstown Parkway and Stockbridge Avenue, Kalamazoo.
Owner: City of Kalamazoo.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 4 in (10 cm), depth 137 ft (42 m), screened 134 to 137 ft (41 to 42 m).
DATUM.--Land-surface datum is 764.7 ft (233.1 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 2.00 ft (0.61 m) above land surface datum.
REMARKS.--Water levels affected by nearby pumping.
PERIOD OF RECORD.--August 1960 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.81 ft (1.47 m) below land-surface datum, Feb. 5, 1975; lowest, 31.08 ft (9.47 m) Aug. 19, 1961.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	9.75	10.03	10.19	10.14	10.14	10.09	9.94	9.85	9.90	10.00	10.21	10.46
10	9.79	10.07	10.19	10.14	10.16	10.09	9.91	9.84	9.91	10.03	10.24	10.49
15	9.83	10.11	10.19	10.16	10.16	10.06	9.88	9.85	9.92	10.06	10.28	10.49
20	9.88	10.15	10.20	10.14	10.14	10.03	9.85	9.87	9.94	10.11	10.32	10.52
25	9.93	10.18	10.18	10.14	10.12	10.00	9.83	9.89	9.95	10.15	10.37	10.54
EOM	10.00	10.19	10.16	10.14	10.11	9.97	9.83	9.90	9.97	10.17	10.43	10.55

WTR YEAR 1982 MAX 9.83 APR 26, 1982 MIN 10.55 SEP 30, 1982

KALAMAZOO COUNTY

421325085404801. Local number, 3S 12W 11BDAD.
LOCATION.--Lat 42°13'25", long 085°40'48", Hydrologic Unit 04050003, at Kalamazoo Community College.
Owner: City of Kalamazoo.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 3 in (7.6 cm), depth 248 ft (76 m).
DATUM.--Altitude of land-surface is 880 ft (268 m). Measuring Point: Top of shelter base, 4.0 ft (1.2 m) above land-surface datum.
PERIOD OF RECORD.--March 1961 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, +2.98 ft (+0.91 m) above land-surface datum, Sept. 4, 1969; lowest, 1.04 ft (0.32 m) below land-surface datum, Aug. 4, 1977.

WATER LEVEL, IN FEET ABOVE AND BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	+0.19	--	--	+0.34	+0.44	+0.30	+0.55	+0.18	+0.18	+0.11	+0.20	--
10	+0.23	--	+0.45	+0.37	+0.46	+0.31	+0.66	+0.13	+0.34	+0.09	+0.18	--
15	+0.03	--	+0.48	+0.38	+0.46	+0.37	+0.75	+0.12	+0.41	+0.09	+0.18	+0.29
20	-0.11	--	+0.41	+0.42	+0.49	+0.47	+0.73	+0.12	+0.26	+0.27	--	--
25	-0.22	--	+0.38	+0.44	+0.42	+0.50	+0.30	+0.07	+0.15	+0.27	--	--
EOM	-0.01	--	+0.34	+0.42	+0.48	+0.55	+0.21	+0.18	+0.09	+0.19	--	--

WTR YEAR 1982 MAX +0.82 APR 16, 1982 MIN -0.27 OCT 27, 1981

KENT COUNTY

425030085434901. Local number, 5N 12W 4DCCD.
LOCATION.--Lat 42°50'30", long 085°43'49", Hydrologic Unit 04050006, 2.1 mi (3.4 km) north of Byron Center and 0.4 mi (0.6 km) west of Byron Center Road.
Owner: City of Wyoming.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 86 ft (26 m).
DATUM.--Land-surface datum is 685.97 ft (209.08 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of shelter base, 2.50 ft (0.76 m) above land-surface datum.
REMARKS.--Monthly measurements begun August 1978.
PERIOD OF RECORD.--October 1962 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 8.28 ft (2.52 m) below land-surface datum, Apr. 14, 1974; lowest, 12.91 ft (3.93 m) Aug. 19, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	10.43	JAN 27	10.55	MAR 11	10.60	APR 20	9.26	JUN 1	9.85	JUL 13	10.67
DEC 22	10.39										

LAKE COUNTY

440737085483701. Local number, 20N 13W 13ACAC1.
LOCATION.--Lat 44°07'37", long 085°48'37", Hydrologic Unit 04060103, 5 mi (8 km) east of Irons.
Owner: U.S. Geological Survey.
AQUIFER.--Outwash deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 57 ft (17 m), screened 42 to 57 ft (13 to 17 m).
DATUM.--Altitude of land-surface datum is 945 ft (288 m). Measuring point: Top of casing 9.0 ft (0.6 m) above land-surface datum.
PERIOD OF RECORD.--March 1980 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 14.70 ft (4.48 m) below land-surface datum, July 22, 1980; lowest measured, 17.71 ft (5.40 m) Mar. 14, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 8	16.87	JAN 14	17.71	APR 14	17.02	JUN 30	15.83	AUG 4	15.96	SEP 9	16.34
DEC 3	17.37	MAR 10	18.00	MAY 13	15.41						

LEELANAU COUNTY

445020086012201. Local number, 28N 14W 8DDCA1.
LOCATION.--Lat 44°50'20", long 086°01'22", Hydrologic Unit 04060104, 2.5 mi (4.0 km) northeast of Empire.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 138 ft (42 m), screened 123 to 138 ft (37 to 42 m).
DATUM.--Altitude of land-surface datum is 750 ft (229 m). Measuring point: Top of casing 2.0 ft (0.6 m) above land surface datum.
PERIOD OF RECORD.--February 1978 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 113.12 ft (34.48 m) below land-surface datum, Mar. 21, 1980; lowest measured, 114.22 ft (34.81 m), May 17, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	113.66	JAN 18	113.93	APR 27	114.16	MAY 17	114.22	JUN 30	114.15	SEP 10	114.01
DEC 1	113.66	MAR 4	113.93								

LEELANAU COUNTY

445011086031401. Local number, 28N 14W 18BABB1.
LOCATION.--Lat 44°50'11", long 086°03'14", Hydrologic Unit 04060104, 2 mi (3 km) north of Empire.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 60 ft (18 m), screened 45 to 60 ft (14 to 18 m).
DATUM.--Altitude of land-surface datum is 625 ft (190 m). Measuring point: Top of casing 2.0 ft (0.6 m) above land-surface datum.
PERIOD OF RECORD.--November 1979 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 22.91 ft (6.98 m) below land-surface datum, Apr. 12, 1982; lowest, 24.76 ft (7.55 m) Sept. 29, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	24.44	24.37	24.34	24.28	24.42	24.51	23.46	23.21	23.69	24.10	24.40	24.64
10	24.45	24.37	24.32	24.28	24.43	24.53	22.94	23.30	23.77	24.16	24.44	24.66
15	24.45	24.35	24.30	24.29	24.45	24.52	22.96	23.39	23.84	24.22	24.48	24.69
20	24.44	24.34	24.30	24.35	24.45	24.42	22.93	23.45	23.90	24.26	24.53	24.72
25	24.41	24.36	24.29	24.35	24.49	24.36	22.97	23.52	23.98	24.30	24.56	24.74
EOM	24.39	24.36	24.29	24.39	24.49	24.09	23.12	23.60	24.04	24.36	24.60	24.76

WTR YEAR 1982 MAX 22.91 APR 12, 1982 MIN 24.76 SEP 29, 1982

LENAWEE COUNTY

420246084150601. Local number, 5S 1E 12DDBD.
LOCATION.--Lat 42°02'40", long 084°15'06", Hydrologic Unit 04100002, 2 mi (3 km) west of Cambridge Junction on the Onsted State Game Area.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 1¼ in (3.2 cm), depth 39 ft (12 m), screened 36 to 39 ft (11 to 12 m).
DATUM.--Altitude of land-surface datum is 1,000 ft (305 m). Measuring point: Top of casing, 3.00 ft (0.91 m) above land-surface datum.
PERIOD OF RECORD.--December 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 15.89 ft (4.84 m) below land-surface datum, Mar. 26, 1982; lowest measured, 19.33 ft (5.89 m) Sept. 2, 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 19	16.79	JAN 13	16.76	MAR 26	15.89	MAY 6	16.65	JUN 8	16.81	AUG 31	17.47
NOV 19	16.85	FEB 12	16.77								

LIVINGSTON COUNTY

422853083402801. Local number, 1N 6E 13DBAB.
LOCATION.--Lat 42°28'53", long 083°40'28", Hydrologic Unit 04090005, 2 mi (3 km) northwest of South Lyon on Twelve Mile Road.
Owner: American Aggregate Corporation.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 2 in (5 cm), depth 29 ft (9 m), 1¼ in (3.2 cm) diameter screen.
DATUM.--Altitude of land-surface datum is 930 ft (283 m). Measuring point: Plywood instrument shelf, 2.50 ft (0.76 m) above land-surface datum.
PERIOD OF RECORD.--April 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 12.1 ft (3.7 m) below land-surface datum, Apr. 22, 1974; lowest, 21.58 ft (6.58 m) Oct. 30, 31, Nov. 1, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	14.65	14.35	14.69	15.07	15.26	15.39	--	--	13.61	13.94	14.02	14.80
10	14.65	14.37	14.92	15.11	15.26	15.45	--	--	13.64	13.82	14.20	14.89
15	14.61	14.55	14.94	15.17	15.27	14.65	--	--	13.72	13.82	14.33	14.97
20	14.55	14.59	14.95	15.18	15.28	14.24	--	13.56	13.72	13.85	14.35	15.07
25	14.31	14.64	14.98	15.19	15.34	13.84	--	13.59	13.86	13.90	14.40	15.11
EOM	14.31	14.66	15.04	15.23	15.39	13.61	--	13.62	13.91	13.93	14.65	15.11

WTR YEAR 1982 MAX 13.54 MAR 31, 1982 MIN 15.45 MAR 9, 1982

MACKINAC COUNTY

460321084354801. Local number, 42N 2W 7AABB.
LOCATION.--Lat 46°03'21", long 084°35'48", Hydrologic Unit 04070002, 2 mi (3 km) north of Pontchartrain Shores at Pontchartrain and St. Ignace Roads.
Owner: U.S. Forest Service.
AQUIFER.--Manistique Dolomite of Silurian age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 6 in (15 cm), depth 102 ft (31 m).
DATUM.--Altitude of land-surface datum is 650 ft (198 m). Measuring point: Top of shelter floor, 2.3 ft (0.7 m) above land-surface datum.
PERIOD OF RECORD.--June 1956 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 13.1 ft (4.0 m) below land-surface datum, May 11, 1960; lowest, 32.3 ft (9.8 m) Feb. 7, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	30.10	27.91	26.57	27.49	28.36	28.97	20.64	19.31	23.66	26.25	26.36	27.43
10	30.22	28.08	26.81	27.65	28.37	29.14	21.80	20.43	24.17	26.57	27.20	26.43
15	30.21	28.01	26.92	27.75	28.50	27.61	20.59	20.95	24.60	26.96	27.73	26.89
20	27.94	27.98	27.24	28.03	28.66	27.66	16.21	21.42	25.05	27.24	28.03	26.07
25	28.18	28.20	27.32	28.17	29.00	27.31	16.31	22.08	25.44	27.47	28.27	25.05
EOM	28.15	28.17	27.47	28.17	29.05	26.26	17.90	22.84	25.89	27.76	28.64	24.90

WTR YEAR 1982 MAX 26.17 APR 20, 1982 MIN 30.28 OCT 13, 1982

MARQUETTE COUNTY

462938087475901. Local number, 47N 28W 3CCDC.
LOCATION.--Lat 46°29'38", long 087°47'59", Hydrologic Unit 04020105, 4.8 mi (7.7 km) west of Ishpeming on U.S. Highway 41 and M-28.
Owner: Ely Township.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 8 in (20 cm), depth 72 ft (22 m), screened 68 to 72 ft (19 to 22 m).
DATUM.--Land-surface datum is 1,571.99 ft (479.14 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of recorder base, 3.0 ft (0.9 m) above land-surface datum.
REMARKS.--Federal key well.
PERIOD OF RECORD.--August 1961 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 9.74 ft (2.97 m) below land-surface datum, May 13, 1974; lowest, 19.26 ft (5.87 m) Apr. 10-11, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	14.90	14.62	15.23	15.76	16.31	16.86	16.98	13.57	13.39	13.97	13.92	14.34
10	14.82	14.77	15.34	15.85	16.40	16.93	16.69	13.45	13.50	14.08	13.97	14.24
15	14.81	14.83	15.41	15.93	16.51	17.00	16.55	13.26	13.55	13.93	14.06	14.34
20	14.68	14.93	15.47	16.06	16.63	17.05	15.56	13.18	13.62	13.71	14.17	14.35
25	14.49	15.02	15.56	16.16	16.73	17.12	14.91	13.16	13.75	13.78	14.26	14.34
EOM	14.58	15.11	15.68	16.25	16.79	17.16	13.84	13.24	13.86	13.87	14.34	14.35

WTR YEAR 1982 MAX 13.15 MAY 19, 1982 MIN 17.18 MAR 29, 1982

MENOMINEE COUNTY

453504087331301. Local number, 37N 26W 19DADA.
LOCATION.--Lat 45°35'04", long 087°33'13", Hydrologic Unit 04030108, on Highway U.S. 41 at Carney.
Owner: State Highway Department.
AQUIFER.--Trenton Limestone and Black River Formation of Middle Ordovician age.
WELL CHARACTERISTICS.--Water-table well, diameter 4 in (10 cm), depth 17 ft (5 m), cased.
DATUM.--Altitude of land-surface datum is 800 ft (244 m). Measuring point: Top of 2 in (5 cm) reducing nipple, 1.26 ft (0.38 m) above land-surface datum.
PERIOD OF RECORD.--September 1959 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.47 ft (1.06 m) below land-surface datum, Apr. 12, 1979; lowest measured, 8.62 ft (2.63 m) Jan. 17, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 14	4.90	MAR 23	4.18	JUN 2	5.22	JUL 28	4.90

MONROE COUNTY

415206083414401. Local number, 7S 6E 15ACAA.
LOCATION.--Lat 41°52'06", long 083°41'44", Hydrologic Unit 04100002, on Teal Road 2 mi (3 km) southeast of Petersburg.
Owner: U.S. Geological Survey.
AQUIFER.--Detroit River Group of Devonian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 72 ft (22 m), cased to 53 ft (16 m), open end.
DATUM.--Altitude of land-surface datum is 680 ft (207 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--November 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 32.30 ft (9.85 m) below land-surface datum, Mar. 26, 1982; lowest measured, 40.55 ft (12.36 m) Nov. 2, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 19	34.52	JAN 6	33.54	MAR 26	32.30	MAY 3	32.93	JUN 8	34.13	AUG 31	39.79
NOV 19	32.58	FEB 12	34.48								

MONROE COUNTY

415235083414001. Local number, 7S 6E 15ADBB.
LOCATION.--Lat 41°52'35", long 083°41'50", Hydrologic Unit 04100002, 1.5 mi (2.4 km) southeast of Petersburg on Teal Road.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 1¼ in (3.2 cm), depth 17 ft (5 m), screened 14 to 17 ft (4 to 5 m).
DATUM.--Altitude of land-surface datum is 675 ft (206 m). Measuring point: Top of casing, 4.00 ft (1.22 m) above land-surface datum.
PERIOD OF RECORD.--December 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.00 ft (0.91 m) below land-surface datum, Feb. 14, 1966; lowest measured, 6.69 ft (2.04 m), Dec. 29, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 19	4.26	JAN 6	4.55	FEB 12	5.02	MAR 26	3.95	MAY 3	4.25	JUN 8	4.40
NOV 19	4.17										

MUSKEGON COUNTY

431806086044401. Local number, 11N 15W 34ADDD.
LOCATION.--Lat 43°18'06", long 086°04'44", Hydrologic Unit 04060102, 8 mi (13 km) northeast of Holton on Holton-Duck Lake Road.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 1¼ in (3.2 cm), depth 31 ft (9 m), screened 28 to 31 ft (8.5 to 9 m).
DATUM.--Altitude of land-surface datum is 595 ft (181 m). Measuring point: Top of casing, 4.00 ft (1.22 m) above land-surface datum.
PERIOD OF RECORD.--November 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, +0.16 ft (+0.05 m) above land-surface datum, May 22, 1974; lowest measured, 4.74 ft (1.44 m) below land-surface datum, Sept. 5, 1972.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	0.42	DEC 23	1.19	APR 13	0.08	JUL 14	2.27

OAKLAND COUNTY

425116083321501. Local number, 5N 8E 8ACAC.
LOCATION.--Lat 42°51'16", long 083°32'15", Hydrologic Unit 04080204, 6 m (10 km) northeast of Holly on Van Road.
Owner: State Department of Natural Resources.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 1¼ in (3.2 cm), depth 42 ft (13 m), screened 39 to 42 ft (12 to 13 m).
DATUM.--Altitude of land-surface datum is 930 ft (283 m). Measuring point: Top of casing, 3.00 ft (0.91 m) above land-surface datum.
PERIOD OF RECORD.--November 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 22.30 ft (6.80 m) below land-surface datum, Apr. 24, 1974; lowest measured, 26.48 ft (8.07 m) Sept. 9, 1966.

WATER LEVEL IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 28	24.85	JAN 12	24.93	APR 7	24.07	MAY 18	24.49	JUN 22	24.60	SEP 14	25.63
DEC 2	24.79	FEB 23	25.02								

OCEANA COUNTY

433133086082601. Local number, 13N 15W 18AAAA.
LOCATION.--Lat 43°31'33", long 086°08'26", Hydrologic Unit 04060101, approximately 6 in (10 km) southwest of Hesperia.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 79 ft (24 m), screened 69 to 79 ft (21 to 24 m).
DATUM.--Altitude of land-surface datum is 703 ft (214 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.
REMARKS.--Continuous recorder installed, July 10, 1979.
PERIOD OF RECORD.--August 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 36.10 ft (11.00 m) below land-surface datum, May 25, 1978; lowest 40.99 ft (12.49 m) Mar. 28, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	39.35	39.69	40.04	40.32	40.56	40.79	40.97	38.61	37.72	37.73	37.93	37.35
10	39.42	39.76	40.09	40.36	40.60	40.83	40.72	38.31	37.69	37.75	37.79	37.31
15	39.47	39.81	40.14	40.39	40.64	40.87	40.46	38.10	37.67	37.83	37.64	37.29
20	39.53	39.86	40.19	40.44	40.67	40.91	40.20	37.94	37.64	37.88	37.53	37.29
25	39.58	39.92	40.23	40.48	40.73	40.95	39.66	37.86	37.68	37.92	37.48	37.29
EOM	39.66	39.98	40.27	40.52	40.75	40.98	39.06	37.76	37.71	37.97	37.40	37.32

WTR YEAR 1982 MAX 37.25 SEP 19, 1982 MIN 40.99 MAR 28, 1982

OGEMAW COUNTY

442514084164702. Local number, 32N 1E 2BAAA.
LOCATION.--Lat 44°25'14", long 084°16'47", Hydrologic Unit 04070007, 8 mi (13 km) west of Rose City on south side of Rose City Road.
Owner: Ogemaw County Road Commission.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 1½ in (3.8 cm), depth 20 ft (6 m).
DATUM.--Altitude of land-surface datum is 1,265 ft (386 m). Measuring point: Top of casing, 2.30 ft (0.70 m) above land-surface datum.
PERIOD OF RECORD.--November 1968 to October 1971. April 1974 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 7.62 ft (2.32 m) below land-surface datum, Apr. 13, 1976; lowest measured, 13.6 ft (4.1 m) December 1972.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 19	11.52	JAN 20	12.31	APR 26	10.41	JUL 19	10.93

ONTONAGON COUNTY

465002089321601. Local number, 51N 41W 8BDBC.
LOCATION.--Lat 46°50'02", long 089°32'16", Hydrologic Unit 04020101, 325 ft (99 m) south of M-64, 1.5 mi (2.4 km) east of Silver City.
Owner: State Corrections Department.
AQUIFER.--Freda Sandstone of Keweenawan age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 100 ft (30 m), cased to 32 ft (10 m).
DATUM.--Altitude of land-surface datum is 620 ft (189 m). Measuring point: Plywood instrument shelf, 3.50 ft (1.07 m) above land-surface datum.
PERIOD OF RECORD.--October 1958 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 8.20 ft (2.50 m) below land-surface datum, Apr. 15, 1959; lowest measured, 21.82 ft (6.65 m) Dec. 15, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 27	11.75	JAN 19	11.15	APR 26	8.75	JUL 21	10.27	SEP 23	10.29

OTSEGO COUNTY

445920084425801. Local number, 30N 3W 19ABBB.
LOCATION.--Lat 44°59'20", long 084°42'58", Hydrologic Unit 04070007, on Old Alba Road 3 mi (5 km) southwest of Gaylord.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 87 ft (27 km), screened 72 to 87 ft (22 to 27 km).
DATUM.--Altitude of land-surface datum is 1307 ft (399 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--January 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 30.69 ft (9.35 m) below land-surface datum, July 24, 1979; lowest measured, 35.82 ft (10.92 m) Apr. 1, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 16	34.68	JAN 6	35.10	APR 1	35.82	JUN 15	34.24	JUL 26	34.42	AUG 31	34.73
DEC 10	34.89	FEB 11	35.44	MAY 4	35.22						

PRESQUE ISLE

451634083441801. Local number, 33N 6E 8BBBB.
LOCATION.--Lat 45°16'34", long 083°44'18", Hydrologic Unit 04070006, south side of Grand Lake Highway, 2 mi (3 km) west and 1 mi (2 km) north of Posen.
Owner: A. Styma.
AQUIFER.--Traverse Group.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 61 ft (19 m).
DATUM.--Altitude of land-surface datum is 815 ft (248 m). Measuring point: Top of casing, 0.5 ft (0.2 m) above land-surface datum.
PERIOD OF RECORD.--December 1959 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.10 ft (1.55 m) below land-surface datum, Mar. 2, 1979; lowest measured, 16.83 ft (5.13 m) Mar. 5, 1963.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 16	14.98	FEB 8	16.68	MAY 19	8.74	JUL 21	10.85

ROSCOMMON COUNTY

442722084350701. Local number, 24N 2W 20BABA.
LOCATION.--Lat 44°27'22", long 084°35'07", Hydrologic Unit 04070007, 2 mi (3 km) south of Roscommon and 0.5 mi (0.8 km) east of highway M-18 on highway M-103.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Jetted water-table well, diameter 8 in (20 cm), depth 14 ft (4 m), open bottom.
DATUM.--Land-surface datum is 1,145.30 ft (349.09 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 2.50 ft (0.76 m) above land-surface datum.
REMARKS.--Federal key well.
PERIOD OF RECORD.--December 1934 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 2.30 ft (0.70 m) below land-surface datum, Apr. 23, 1971; lowest, 6.23 ft (1.90 m) Dec. 6-11, 1949.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	5.26	5.22	5.09	5.23	5.35	5.45	--	3.44	4.04	4.34	4.57	--
10	5.25	5.24	5.08	5.25	5.36	5.47	--	3.57	4.12	4.44	4.71	--
15	5.26	5.27	5.09	5.28	5.36	5.34	--	3.69	4.19	4.49	4.79	--
20	5.22	5.29	5.13	5.31	5.40	5.38	3.54	3.76	4.21	4.50	4.87	5.01
25	5.20	5.30	5.17	5.32	5.42	--	3.38	3.88	4.20	4.59	4.91	4.99
EOM	5.21	5.13	5.21	5.34	5.43	--	3.36	3.96	4.27	4.67	4.94	4.69

WTR YEAR 1982 MAX 3.35 APR 27, 1982 MIN 5.48 MAR 12, 1982

SAGINAW COUNTY

431457084194401. Local number, 10N 1E 22DADA1.
LOCATION.--Lat 43°14'57", long 084°19'44", Hydrologic Unit 04080203, west side of Merrill Road 0.35 mi (0.56 m) north of Marion Springs.
Owner: U.S. Geological Survey.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 210 ft (64 m), cased to 170 ft (52 m).
DATUM.--Altitude of land-surface datum is 657 ft (200 m). Measuring point: Plywood instrument shelf, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--December 1977 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 7.93 ft (2.42 m) below land-surface datum, Feb. 10, 1981; lowest 10.00 ft (3.05 m) Sept. 14, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	8.59	8.33	8.25	--	--	8.36	8.62	8.66	8.88	9.07	9.40	9.54
10	8.65	8.43	8.24	--	8.15	8.42	8.55	8.73	8.88	9.08	9.40	9.57
15	8.58	8.31	8.17	--	8.14	8.44	8.60	8.79	8.89	9.17	9.47	9.60
20	8.49	8.10	8.16	--	8.16	8.52	8.64	8.81	8.84	9.19	9.50	9.56
25	8.47	8.25	8.16	--	8.45	8.54	8.62	8.79	8.97	9.28	9.43	9.56
EOM	8.47	8.25	8.04	--	8.43	8.52	8.71	8.74	9.01	9.29	9.52	9.68

WTR YEAR 1982 MAX 7.96 DEC 27, 1981 MIN 9.68 SEP 30, 1982

SANILAC COUNTY

433439082523601. Local number, 13N 13E 12ADAA.
LOCATION.--Lat 43°34'39", long 082°52'36", Hydrologic Unit 04090001, on Wheatland Road 3 mi (5 km) east and .75 mi (1.21 km) north of argyle.
Owner: U.S. Geological Survey.
AQUIFER.--Marshall Formation of Mississippian age.
WELL CHARACTERISTICS.--Drilled artesian observation well, diameter 6 in (15 cm), depth 130 ft (40 m), cased with plastic pipe to 48 ft (15 m), open bottom.
DATUM.--Altitude of land-surface datum is 805 ft (245 m). Measuring point: Plywood instrument shelf, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--October 15, 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 16.44 ft (5.01 m) below land-surface datum, Apr. 3, 1982; lowest 22.71 ft (6.92 m) Nov. 20, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	17.79	17.86	17.68	--	18.23	18.22	16.87	17.21	17.17	17.86	18.87	19.69
10	17.83	17.86	17.72	--	18.24	18.30	16.73	17.09	17.55	18.17	19.03	19.82
15	17.94	17.86	17.75	17.89	18.22	17.38	16.76	17.33	17.81	18.46	19.27	19.98
20	17.86	17.88	17.92	18.12	18.15	16.97	16.78	17.58	17.18	18.61	19.49	20.02
25	17.77	17.65	17.94	18.13	18.23	16.79	16.90	17.61	17.17	18.86	19.46	19.97
EOM	17.84	17.55	--	18.19	18.15	16.61	17.07	17.77	17.55	18.68	19.57	19.93

WTR YEAR 1982 MAX 16.44 APR 3, 1982 MIN 20.17 SEP 22, 1982

SCHOOLCRAFT COUNTY

461720085565201. Local number, 45N 13W 16CCCB.
LOCATION.--Lat 46°17'20", long 085°56'52", Hydrologic Unit 04060106, at headquarters building Seney Wildlife refuge.
Owner: U.S. Fish and Wildlife Service.
AQUIFER.--Limestones of Upper Ordovician age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 4 in (10 cm), depth 151 ft (46 m), cased to 65 ft (20 m).
DATUM.--Altitude of land-surface datum is 710 ft (216 m). Measuring point: Top of casing, 3.60 ft (1.10 m) below land-surface datum.
PERIOD OF RECORD.--June 1952 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.64 ft (1.41 m) below land-surface datum, Apr. 13, 1971; lowest, 6.50 ft (1.98 m) Oct. 23, 1963.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	5.86	5.64	5.60	5.40	5.20	--	--	--	5.65	5.78	--	5.71
10	5.82	5.65	5.61	5.32	--	--	--	--	5.67	5.79	--	5.68
15	5.85	5.64	5.57	5.25	--	--	--	--	5.63	5.68	--	5.69
20	5.74	5.65	5.57	5.30	--	--	5.24	--	5.66	5.63	5.78	5.60
25	5.62	5.69	5.56	5.20	--	--	--	--	5.71	5.68	5.78	5.57
EOM	5.65	5.63	5.55	5.22	--	--	--	--	5.76	5.72	5.77	5.59

WTR YEAR 1982 MAX 5.00 MAR 1982 MIN 5.95 OCT 1, 1981

VAN BUREN COUNTY

421435085591001. Local number, 3S 14W 6BAAD.
LOCATION.--Lat 42°14'35", long 085°59'10", Hydrologic Unit 04050001, 5 mi (8 km) northwest of Paw Paw at the southwest corner of 45th and 48th Streets.
Owner: Rex Martin.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 1½ in (3.8 cm), depth 59 ft (18 m), screened 56 to 59 ft (17 to 18 m).
DATUM.--Altitude of land-surface datum is 740 ft (226 m). Measuring point: Top of casing, 0.5 ft (.2 m) above land-surface datum.
PERIOD OF RECORD.--May 1963 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 37.22 ft (11.34 m) below land-surface datum, May 30, 1974; lowest measured, 43.28 ft (13.19 m) Nov. 20, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 15	39.62	JAN 6	39.63	APR 2	37.85	JUN 4	38.04	JUN 30	38.60	JUL 29	38.71
NOV 25	39.70	FEB 24	39.69	27	37.68						

WASHTENAW COUNTY

421228083331601. Local number, 3S 7E 24CACA.
LOCATION.--Lat 42°12'28", long 083°33'16", Hydrologic Unit 04090005, at Ypsilanti Township waterworks on Bridge Street.
Owner: Ypsilanti Township.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 4 in (10 cm), depth 80 ft (24 m), screened 77 to 80 ft (23 to 24 m).
DATUM.--Land-surface datum is 665.65 ft (202.86 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of coupling, 3.00 ft (0.91 m) above land-surface datum.
REMARKS.--Water level affected by nearby pumping.
PERIOD OF RECORD.--July 1943 to June 1945, December 1949 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 5.79 ft (1.76 m) below land-surface datum, Jan. 5, 1950; lowest, 22.66 ft (6.91 m) Feb. 13, 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	12.37	12.68	14.17	--	14.83	14.54	12.95	12.86	12.65	12.62	--	12.73
10	12.53	13.25	14.17	14.39	14.76	14.67	13.08	12.77	12.77	12.62	--	12.66
15	12.59	13.66	14.17	14.54	14.69	13.75	13.27	12.65	12.71	--	--	12.71
20	12.63	13.66	14.31	14.73	14.49	--	13.40	12.73	12.66	--	--	12.63
25	12.58	13.95	14.35	14.79	14.55	--	13.34	12.72	12.64	--	--	12.66
EOM	12.71	14.03	--	14.75	14.44	12.77	12.99	12.65	12.60	--	--	12.66

WTR YEAR 1982 MAX 12.25 OCT 3, 1981 MIN 14.88 JAN 29, 1982

Temperatures of ground water are measured as part of a state-wide water resource investigation in cooperation with Michigan Department of Natural Resources. The purpose of these measurements is to determine the natural ground-water temperature of selected points throughout the State. These data can be used to estimate ground-water temperatures in many areas in the State. Measurements of temperature were made by means of "lazy" thermometers (Heath, 1964).

TEMPERATURE (°C) OF GROUND WATER AT INDICATED DEPTH

ALGER COUNTY, 45N 19W 25BDCD1 (LAT 46°16'08", LONG 86°37'38") DEPTH 66 FT (20 m)

DATE	WATER TEMPERATURE (°C)	DATE	WATER TEMPERATURE (°C)	DATE	WATER TEMPERATURE (°C)
OCT 8, 1981	7.5	APR 9 . . .	7.5	JUL 28 . . .	7.5
FEB 4, 1982	7.5	MAY 25 . . .	7.0		

DICKINSON COUNTY, 43N 28W 32ADAB1 (LAT 46°04'59", LONG 87°49'37") DEPTH 31 FT (9 m)

DATE	WATER TEMPERATURE (°C)	DATE	WATER TEMPERATURE (°C)	DATE	WATER TEMPERATURE (°C)
OCT 14, 1981	7.0	FEB 25 . . .	7.0	JUN 30 . . .	6.0
NOV 9 . . .	7.5	APR 1 . . .	7.0	JUL 29 . . .	6.0
DEC 16 . . .	7.5	JUN 1	6.0	SEP 1 . . .	6.5
JAN 28, 1982	7.5				

LENAWEE COUNTY, 5S 1E 12DDBD1 (LAT 42°02'46", LONG 84°15'06") DEPTH 39 FT (12 m)

DATE	WATER TEMPERATURE (°C)	DATE	WATER TEMPERATURE (°C)	DATE	WATER TEMPERATURE (°C)
OCT 19, 1981	9.5	FEB 12 . . .	10.0	JUN 8 . . .	8.5
NOV 19 . . .	10.0	MAR 26 . . .	9.5	AUG 31 . . .	9.0
JAN 13, 1982	10.0	MAY 6 . . .	9.0		

MENOMINEE COUNTY, 37N 26W 19DADA1 (LAT 45°35'00", LONG 87°33'15") DEPTH 17 ft (5 m)

DATE	WATER TEMPERATURE (°C)	DATE	WATER TEMPERATURE (°C)	DATE	WATER TEMPERATURE (°C)
DEC 14, 1981	8.0	JUN 2 . . .	6.5	JUL 28 . . .	9.0
MAR 23, 1982	6.0				

MUSKEGON COUNTY, 11N 15W 34ADDD1 (LAT 43°18'06", LONG 86°04'44") DEPTH 31 FT (9 m)

DATE	WATER TEMPERATURE (°C)	DATE	WATER TEMPERATURE (°C)	DATE	WATER TEMPERATURE (°C)
OCT 7, 1981	10.0	APR 13, 1982	8.0	JUL 14 . . .	9.0

OAKLAND COUNTY, 5N 8E 8ACAC1 (LAT 42°51'16", LONG 83°32'15") DEPTH 42 FT (13 m)

DATE	WATER TEMPERATURE (°C)	DATE	WATER TEMPERATURE (°C)	DATE	WATER TEMPERATURE (°C)
OCT 28, 1981	9.0	FEB 23 . . .	8.5	JUN 22 . . .	8.5
DEC 2 . . .	8.5	APR 7 . . .	8.0	SEP 14 . . .	10.0
JAN 12, 1982	9.0	MAY 18 . . .	9.5		

ONTONAGON COUNTY, 46N 38W 30ADDD1 (LAT 46°21'18", LONG 89°05'43") DEPTH 50 FT (15 m)

DATE	WATER TEMPERATURE (°C)	DATE	WATER TEMPERATURE (°C)	DATE	WATER TEMPERATURE (°C)
OCT 26, 1981	8.0	MAR 2 . . .	7.0	JUL 20 . . .	6.5
DEC 8 . . .	7.0	APR 26 . . .	7.0	AUG 16 . . .	6.5
JAN 18, 1982	7.5	JUN 15 . . .	7.0		

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October 1, 1978

FACTORS FOR CONVERTING INCH-POUND UNITS TO INTERNATIONAL SYSTEM UNITS (SI)

The following factors may be used to convert the inch-pound units published herein to the International System of Units (SI). This report contains both the inch-pound and SI unit equivalents in the station manuscript descriptions.

Multiply inch-pound units	By	To obtain SI units
	Length	
inches (in)	2.54×10^{1}	millimeters (mm)
	2.54×10^{-2}	meters (m)
feet (ft)	3.048×10^{-1}	meters (m)
miles (mi)	1.609×10^{0}	kilometers (km)
	Area	
acres	4.047×10^{3}	square meters (m^2)
	4.047×10^{-1}	square hectometers (hm^2)
	4.047×10^{-3}	square kilometers (km^2)
square miles (mi^2)	2.590×10^{0}	square kilometers (km^2)
	Volume	
gallons (gal)	3.785×10^{0}	liters (L)
	3.785×10^{0}	cubic decimeters (dm^3)
	3.785×10^{-3}	cubic meters (m^3)
million gallons	3.785×10^{3}	cubic meters (m^3)
	3.785×10^{-3}	cubic hectometers (hm^3)
cubic feet (ft^3)	2.832×10^{1}	cubic decimeters (dm^3)
	2.832×10^{-2}	cubic meters (m^3)
cfs-days	2.447×10^{3}	cubic meters (m^3)
	2.447×10^{-3}	cubic hectometers (hm^3)
acre-feet (acre-ft)	1.233×10^{3}	cubic meters (m^3)
	1.233×10^{-3}	cubic hectometers (hm^3)
	1.233×10^{-6}	cubic kilometers (km^3)
	Flow	
cubic feet per second (ft^3/s)	2.832×10^{1}	liters per second (L/s)
	2.832×10^{1}	cubic decimeters per second (dm^3/s)
	2.832×10^{-2}	cubic meters per second (m^3/s)
gallons per minute (gal/min)	6.309×10^{-2}	liters per second (L/s)
	6.309×10^{-2}	cubic decimeters per second (dm^3/s)
	6.309×10^{-5}	cubic meters per second (m^3/s)
million gallons per day	4.381×10^{1}	cubic decimeters per second (dm^3/s)
	4.381×10^{-2}	cubic meters per second (m^3/s)
	Mass	
tons (short)	9.072×10^{-1}	megagrams (Mg) or metric tons